the OIL AND GAS JOURNAL

PUBLISHED WEEKLY NOVEMBER 13, 1961

PRE AP NUMBER

OIl's big meeting starts today. p. 109

What's in the new imports program ▸ 115

New ideas will cut coal-pipeline costs ▸ 122

It's a record deep-drilling year down South ▸ 124

The case for air-cooled exchangers ▸ 162

SPECIAL REPORT:

An oil man's guide to Washington

p.135

No. 10,000
(with Emcorector)

No. 5000

No. 3000
(with Combined
Record Gauge)

**100 PSI
WORKING
PRESSURE**

No. 1600

LARGE CAPACITY ALUMINUM GAS METERS

There's a Rockwell Meter to Fit Every Field Measurement Need

- LEASE ACCOUNTING
- INTER-COMPANY REPORTS
- INTRA-COMPANY SALES
- PIPELINE TAPS
- FIELD PROCESSING
- IRRIGATION FUEL

Rockwell alone can fit all your service needs from the *only* complete line of aluminum meters. These meters are numbered according to capacity ratings. Ratings ranging from 1600 to 10,000 cfh at 4 oz. inlet can be increased substantially by measuring gas at higher pressures—up to 100 psi. Corrections to base pressure are then made with either Emcorectors or Combined Record Gauges.

Rockwell aluminum meters are light in weight—easier to handle and install. Weathering is no problem, neither are the bumps and knocks encountered in the field. Single joint construction means safety—also simplifies access to the inner mechanism which is removable and interchangeable as a unit.

For catalog write Rockwell Manufacturing Co., Dept. 43-L, Pittsburgh 8, Pa. In Canada: Rockwell Manufacturing Co. of Canada, Ltd., Box 420, Guelph, Ont.

ALUMINUM GAS METERS
another fine product by
ROCKWELL

OIL AND GAS JOURNAL
Vol. 59, No. 46

CONTENTS November 13, 1961

The week's news

General interest:
Critical times may make API meeting one of most important sessions . . 109
API will honor 26 men with certificates of appreciation 110
Oil pushes unprecedented campaigns to expand demand 112
Imports program is getting finishing touches 115
Northeastern British Columbia crude breaks into Vancouver market 121
Mobil likes its dealer conventions 126
Compact Commission expands market study to include gas and liquids . . 127

Pipelining:
Texas commission expected to delay ruling in pipeline-hookup case 116
Pipeline briefs 120
Technical advances bring large-scale coal pipelining nearer 122
Old East Coast pipeline projects may be revived 129

Processing:
Surfactants are adding to jet-fuel contaminant problems 117
Gulf will spread Gulftane marketing; Humble to try new middle grade 120
Kyso breaks ground for new Mississippi refinery 121
Processing briefs 127

Drilling-production:
Pan Am develops cheap, simple down-hole repair technique 119
Southern Louisiana's deep-drilling activity hits a new high 124
Shell selects leases from offshore Mississippi area 128
Water treatment used in attempt to kill Oklahoma wild oil well 128

Foreign news:
Nigeria grants offshore drilling rights 131
British Government approves first LNG commercial project 132
Soviet gas production may not meet ambitious goals 132
First Maracaibo water flood will be a big one 133
Borneo pipeline will use water-oil slurry 134
Yugoslavia will expand refining capacity 134

Exploration:
Oil and Rome—a parallel? 249
Basement rocks could provide key to Texas' largest unexplored trend 250
Young Wyoming field is state's third largest producer 254

Regular features

Advertisers 295
Books 179
Calendar 96
Classified advertising . 291
Discoveries 294
Drilling contractors . . 243
Drilling statistics 286
Editorial 105
Equipment men 230
Exploration 249
Foreign news 131
Foreman's page 169
Journally speaking . . . 103
New equipment 199
Personals 281
Price statistics 289
Profile 281
Processing notes 154
Production statistics . 287
Refining statistics . . . 288
Selected monthly data 290
Statistical summary . . 285
Technical questions . . 188
The Journal said 103
They say 92
Trade literature 224
Watching Washington . 123

Technology section on next page →

The Oil and Gas Journal is published weekly by The Petroleum Publishing Co., 211 S. Cheyenne, Tulsa 3, Okla. Second-Class postage paid at Tulsa, Okla. Copyright 1961 by The Petroleum Publishing Co. United States and foreign rates to the Petroleum industry, 1 year $6, 2 years $9, 3 years $12.

Special report

An oil man's guide to Washington 135
By Clyde La Motte
To the uninformed oil man Washington is complicated and complex at best, and, at worst, absolutely unfathomable. Congress, White House, Interior, Justice, Commerce, regulatory agencies, Office of Emergency Planning, and the Courts all get into the act. Here is a blueprint showing how each fits into the over-all picture and how they work together.

Technology

Refining-Processing

Protecting large motors in a petrochemical plant 151
By Clarence E. Fisher
Jefferson Chemical made sure that its 7,000-hp. motor had simple, yet effective protection and control devices, and had built-in safeguards.
Processing notes 154
Soft-seal valves simplify piping systems—Dow building major petrochemical installation—Calco and Oxo projects progressing on schedule.
Gulf's new THD process 160
By D. H. Stormont
High product yields and freedom from coking problems are features of this new dealkylation process for producing benzene and naphthalene.
The case for air-cooled exchangers—1 162
By J. C. Christman
Air coolers can perform the desired cooling duties during the warmest weather. Early control problems have largely been overcome.
Foreman's page 169
Least-cost estimating and scheduling 170
By F. Backer, Jr., A. W. Barkson, and M. C. Frishberg
Here's a new technique that splits apart planning and scheduling. It finds the critical jobs in a project, whether short and simple or long and complex. It answers the basic management question of how to best control the project.
Thermoflash oil-absorption process 180
By R. J. Hull and R. T. Thompson
This new process uses refrigeration and low-molecular-weight oil, but has very different heat-exchange and stripping arrangements.
Questions on Technology 188

Production

Adena water injection is fulfilling its promise 156
By A. T. Sayre and W. C. Barton, Jr.
Water injection along the gas-oil contact was started in July of 1957, about 3½ years after discovery. Over-all field performance has shown continued capability of producing at efficient solution ratio.
New centrifugal treater passes field tests 194
By W. B. Bleakley
Fireless treating and adaption to automatic operation make this unit ideal for offshore as well as for conventional onshore installations.

Drilling

Prevent dog legs, stop bottom-joint casing failures 190
By Jean Gallon
A dog leg, often created in drilling a small hole below a larger one, causes knocking off bottom joints of intermediate casing, keyseating after coring, and tight hole after rat-holing ahead.

Pipelining

Expansion engine powers compressor-station generator 185
By O. P. Drake
Energy from the expansion of fuel gas is being reclaimed by TGT to generate power at a main-line compressor station. Installation costing $31,000 saves $5,000 annually.

THE OIL AND GAS JOURNAL **Newsletter**

November 13, 1961

Significant this week

Oildom's star convention—the annual API meeting—is being held this year in an atmosphere of crisis.

The problems worrying delegates are big and grim. They range from oversupply to politics. And various facets of these stumbling blocks are due to be examined in some of the most important speeches of the convention.

You don't have to dig deeply to find evidence of the impact of the problems. For example, marketers have been hurt by a woeful gasoline season...producers' income has been scarred by crude-price nicking and squeezed by tight proration ...and all segments of the industry have been made painfully aware of broadening governmental encroachment (p. 109).

Another major topic on API's agenda: Stimulation of new petroleum demand.

There's an interesting piece on that subject in this issue of the Journal. It describes measures the industry is taking to step up demand, particularly for gasoline and heating oil.

Several of these programs—among them API's own travel-promotion efforts—are beginning to stir optimism (p. 112).

As a special feature of this pre-API issue, the Journal presents "An Oil-man's Guide to Washington."

Because the Government is making decisions that have repercussions in all branches of the industry, an understanding of the oil scene in Washington is almost a must.

With the aim of giving you that understanding, Washington Editor Clyde La Motte has turned out the most comprehensive report of its kind ever written (p. 135).

Marketers are wondering about the effect of new moves by Gulf and Humble.

Gulf has told its distributors it will spread its recently introduced "Gulftane" throughout its 39-state sales territory, while Humble this week will become the first company to market a middle-grade gasoline on a wide basis. Humble's dropping its superpremium, and will substitute a gasoline between regular and premium in both price and quality (p. 120).

New oil-import-control program is getting its final check in high administration echelons. Barring unforeseen snag, it should be announced by end of the month, for sure (p. 115).

Old plans for pipelines along East Coast are getting some new study. Companies are looking at an extension of Suwanee to Linden, N. J.; a line to move products on to Boston; and a third to unload tanker crude in lower Delaware Bay and move it to Philadelphia (p. 129).

Technical advances revealed last week will hasten appearance of big-scale coal-slurry pipeline (p. 122).

Other highlights:

Pan American has come up with new method of making fast, cheap down-hole casing repairs with steel "patch" (p. 119).

South Louisiana already boasts record year for deep drilling, with 186 wells drilled below 15,000 ft. so far (p. 124).

Jet-fuel researchers are placing new stress on fight to get rid of surfactants which hinder water separation (p. 117).

Formalities probably will delay Texas Railroad Commission ruling on Duffy pipeline-hookup case until January (p. 116).

Offshore oil play is taking shape in Nigeria, where three U. S. majors have been granted concessions (p. 131).

Creole Petroleum will use eight wells in Lake Maracaibo's first water flood, injecting 320,000 bbl. daily (p. 133).

News in the making

Special election will be held December 16 to pick replacement for Rep. Frank Ikard (D.-Tex.). Ikard's resignation will become effective at that time, freeing him for his new duties as executive vice president of API.

Rep. Walter Rogers (D.-Tex.) is a good bet to be appointed to powerful House Ways and Means Committee to succeed Ikard.

Announcement of an offshore lease sale will be made soon by Bureau of Land Management. BLM is currently studying nominations, and plans lease sales for both Louisiana and Texas early next year—probably in February.

Group of oil witnesses is scheduled to appear before a House Labor Subcommittee during its probe of the impact of oil-import-control program on oil-industry unemployment. Oil witnesses are to testify December 4.

Union and tanker representatives are gathering facts to support their positions in dispute over bargaining rights on U. S.-owned vessels registered under foreign flags.
Material will be turned over to three-man board appointed by Secretary of Labor to study the issue, which generated an 18-day strike last summer and still is unresolved.

String of dusters in Alaska is growing longer.
Three more wildcats have been plugged. That makes five abandonments in the past 6 weeks. Latest dry holes: Pure's

1 Canoe unit on Alaskan Peninsula; two Richfield wildcats along Gulf of Alaska—the 1 Berling River in Katalla area and the 1 White River in Yakataga area.

Rotary-rig activity in U. S. is still hitting fast pace as year's end approaches.

There were 1,879 rigs at work during week that closed on November 6, third highest number in 2 years. Showing was exceeded only by 1,882 rigs during week of September 4, 1961 and by 1,895 rigs during week of May 23, 1960.

Expect seismic work off Oregon to be limited to about 6 months out of the year. Reason: Rugged weather and water conditions.

That's how operators size up situation. Gulf already has pulled out for the year, but Shell is still doing some work.

Impending shortage of geologists is causing real concern among college officials and AAPG leaders. Feeling is that situation could become critical in a couple of years.

Already, department heads at "oil" universities report more recruiters than recruits (University of Texas, University of Oklahoma, Tulsa University, to name a few). Some companies and service groups are offering jobs to students for period between graduation and military service, with promises of jobs to be held for the "duration."

Geophysicists are in demand again, too.

Look for geophysical contractors to form trade association soon.

Contractors generally have taken a beating in past few years because of exploration slump, and they'll try to improve things by cooperative planning. Likely head of new group: Frank Goldstone, retired Shell chief geophysicist.

Hydrogen synthesis is getting a vast amount of attention in research labs throughout the country nowadays.

At least four companies will soon announce improvements, either in conversion methods or in purification processes.

Watch for spurt of activity in remote section of Middle East.

Pan American has tied down another concession there—a 40,000-sq.-mile area in eastern Aden protectorate, which lies along southern rim of Arabian Peninsula. Pan Am made the deal with sultanates of Qu'Aiti and Kathiri. They'll get larger half of 55-45 profit split if commercial oil is found.

Continental Oil is offering India an exploration deal similar to the one under which company will operate in Argentina.

This would be on contract basis with Indian Government paying Continental for crude produced, subject to taxes and royalty. Acreage sought is in southern state of Madras.

Market memo

Nov. 13, 1961

Gasoline prices are still **picking up strength** in the Mid-Continent but the draggy fuel-oil market is beginning to cause concern.

Gasoline generally went up another quarter cent in the midlands last week, with some suppliers and traders **reporting advances** of as much as one-half to a full cent. The realistic spot price for unbranded regular gasoline to jobbers appears to be in the range of 10.25 to 10.50 cents per gallon. Gulf Coast and river prices are dormant.

Fuel-oil prices are **holding steady** at 8.25 to 8.50 cents on the Mid-Continent refinery market, and at 8.50 on the Gulf Coast market. Really cold weather is badly needed in the East Coast and Midwest, however, **before prices can move up** on a good volume demand.

Mobil Oil last week **increased gasoline prices** to dealers in Yuma, Ariz., 4.5 cents per gallon effective November 7. New net dealer buying price is **24.9 cents** for Mobil regular, including federal and state taxes. As usual, dealers will set retail prices.

In addition, Mobil reduced its **dealer tankwagon price** for Mobil regular gasoline in **seven New York counties** to help dealers meet competition. Niagara County got heaviest cut of 3.5 cents—from 12.4 to 8.9 cents. **Others:** Erie County, from 10.6 to 8.6; Orleans, Chautauqua, Genesee, Wyoming, and Cattaraugus, from 13.6 to 11.6 cents. In Erie and Niagara the **commercial consumer tankwagon price** was reduced 1 cent, from 17.3 to 16.3, but in the other five counties the commercial price stayed at 17.3 cents.

In another development, Phillips Petroleum and Mobil **increased** dealer tankwagon postings in Kansas City: Phillips by 5.5 to 6 cents per gallon, Mobil by 5.3. In San Antonio Mobil boosted the tankwagon price from **7.4 to 15.4 cents.** Phillips also removed all temporary jobber and dealer price cuts in Missouri with exception of Joplin-Carthage area.

Mobil market researchers are testing **new color scheme and patios** for service stations.

The new color is a **pastel blue** replacing the familiar red on Mobil stations. The **patios would serve as picnic or refreshment areas** for **tourists.** About a dozen stations sprinkled around the country are making the two tests.

One dealer at Mobil's recent Las Vegas convention for dealers suggested that new **stations have a private office** built in and that such space be provided in old ones. The reason: You can't keep good books while working in a busy general sales area.

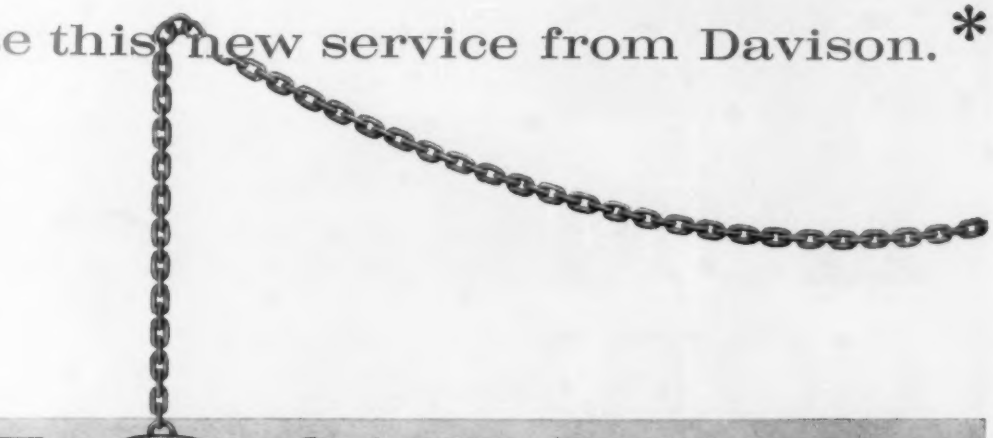
Mobil Chairman A. L. Nickerson blames **guaranteed profit margins** to dealers and jobbers as prime cause of gasoline price wars. He says Mobil opposes the guarantee (p. 126).

Pure Oil and Montgomery Ward have joined in another sales effort at Pure's Lakeland, Fla., "Service City" station.

The large sales room-lounge area of the station has been converted for merchandise retailing as well as receiving catalog orders. Catalog agencies have been opened at three other Pure stations in Illinois and North Carolina.

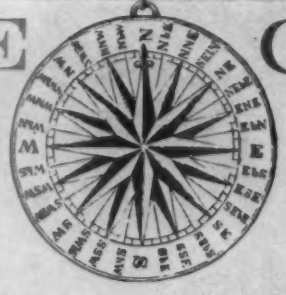
Credit card plans are booming in Europe, stimulated by the expansion of European Common Market activities. One credit-card service bureau reports a backlog of applications.

Your fastest way to locate those refiners who have Equilibrium Catalysts for sale is to use this new service from Davison. *



THE CATLOCATER

AUGUST, 1961



As a part of our continuing customer service program, Davison provides this bi-weekly availability bulletin on Equilibrium Fluid Cracking Catalysts. The sources listed herein and quantities available are constantly subject to change so that these figures are approximations only, based on the latest information available at the time of this mailing.

Whenever you need information or assistance concerning Cracking Catalysts, Mullite, Aluminas, Microtraps, and allied products, the number to call is 727-3912 in Baltimore.

GRACE
DAVISON CHEMICAL

AVAILABILITY OF EQUILIBRIUM FLUID CRACKING CATALYSTS

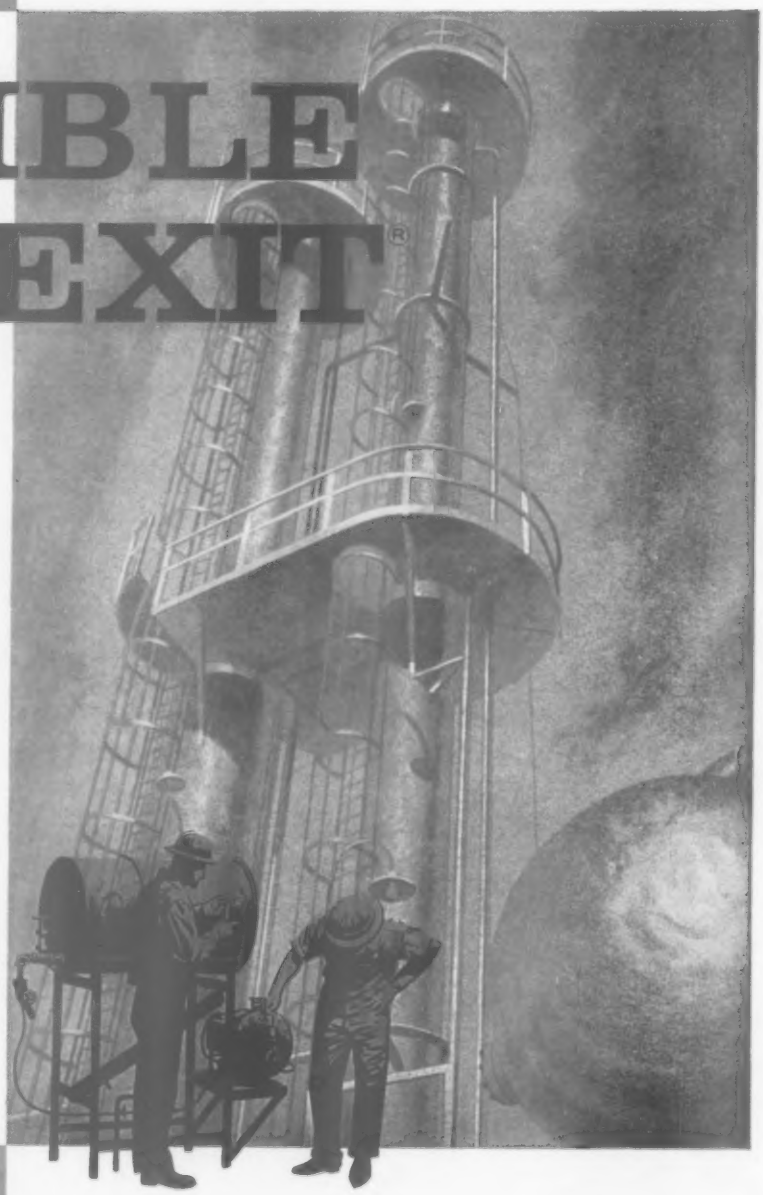
TYPE	QUANTITY	SOURCE
13X	50 Tons	Fphymis Refining Company, Midtown, U.S.A.

*The CATLOCATER is free on request to anyone interested in Equilibrium Catalyst. Listings are inserted as a service. Call the number above or write:

W. R. GRACE & CO., Davison Chemical Division, 101 N. Charles St., Baltimore 3, Md., Att: Mr. J. W. Cugle - Catlocater Dept.

98% protection* against internal corrosion

HUMBLE COREXIT®



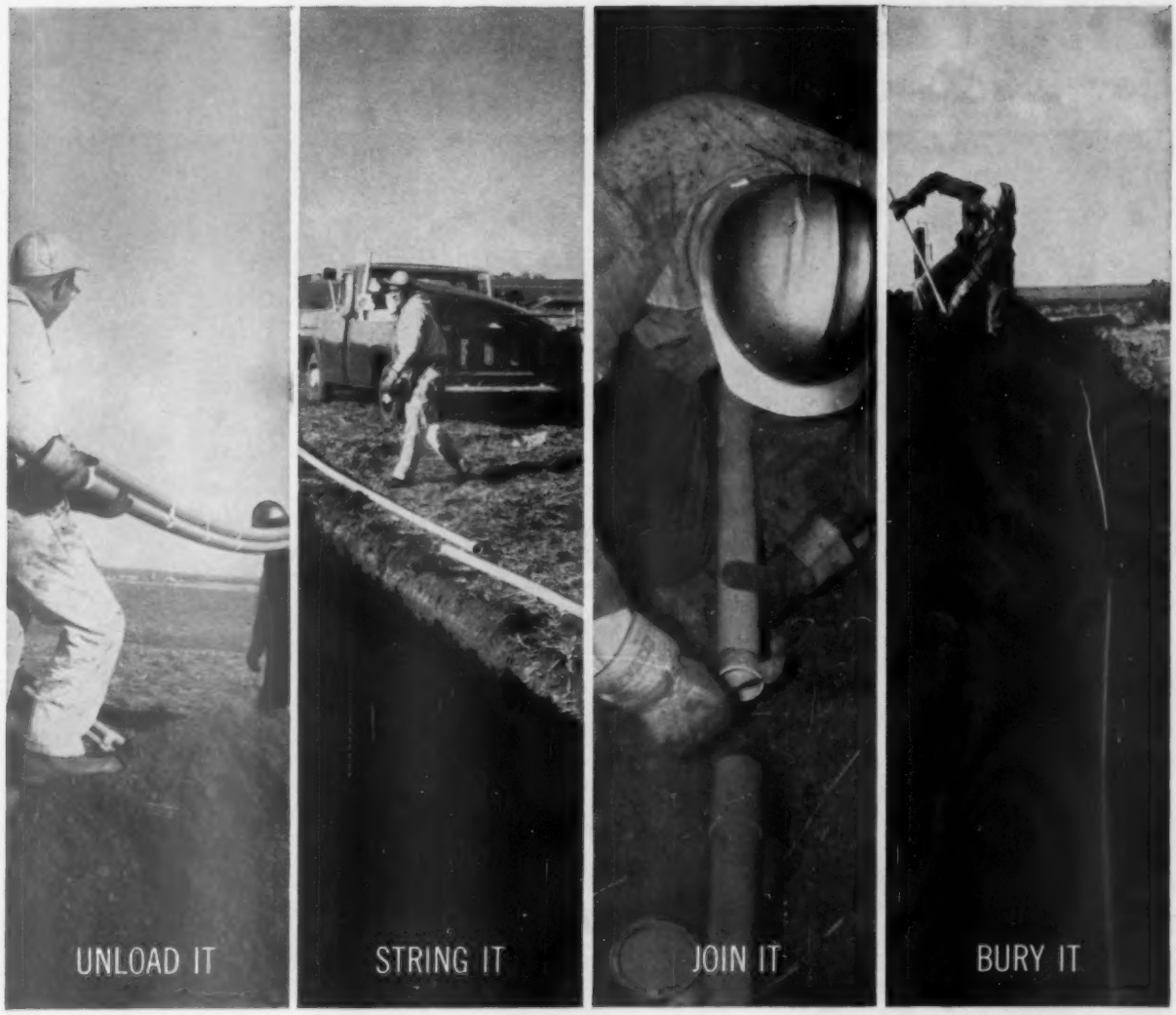
* *Ten years of measurements* in refineries and gas plants prove its high efficiency and economy. For as little as 50¢ per thousand barrels of throughput, Humble COREXIT prevents internal corrosion in pipe still overhead, distillation towers, vapor recovery systems and other refining units. Equipment life is extended, you make longer runs between turn-arounds, and down time is reduced. *COREXIT makes important savings in every refinery and gas plant where it is used.* For complete information on technical services and COREXIT formulations to meet your specific requirements, see your Humble salesman or contact Humble Oil & Refining Company, Houston, Texas.

ENCO PRODUCTS

HUMBLE OIL & REFINING CO.

America's Leading ENergy COmpany

®ENCO and COREXIT are registered trademarks of Humble Oil & Refining Company



Install salt water disposal line the easy-does-it way

Koroseal PVC pipe is fast and easy to install—two men do the job without heavy machinery

THOSE men are installing a 6860-foot pipeline from an oil tank battery to a salt water disposal well.

The pipe is Koroseal rigid PVC—so light that one man can carry five lengths of it without strain. So easy to connect that it takes less than a minute to get Koroseal pipe in position, apply solvent cement with a brush, and push two 20-foot sections together in a slipsleeve fitting. Two men can lay a mile of 3″ Koroseal in eight hours.

Biggest saving comes from the long life of Koroseal rigid PVC pipe. It won't corrode, has exceptional resistance to salt water, sour crude oil, most chemicals. Bury it in the most severe acid or alkali soil, and Koroseal will not rust or deteriorate in any way. Its smooth interior finish virtually eliminates the buildup of salt and paraffin that clogs other pipes.

With all these advantages you might expect Koroseal pipe to be expensive. But the fact is Koroseal costs less than standard steel pipe wrapped for corrosive protection. For full information on Koroseal PVC pipe, write *B.F.Goodrich Industrial Products Co., Dept. M-163, Akron 18, Ohio.*

Koroseal—T.M. Reg. U.S. Pat Off.

Koroseal rigid PVC products by B.F.Goodrich

PROTECTION IN DEPTH

How it helps cut compensation costs

Making hazardous work less hazardous

Making up a joint is rugged work. Handling the slips and drill pipe, throwing chain and operating the tongs are all hazardous functions on the derrick floor. Poor housekeeping and lax maintenance needlessly add to the risks. By checking your rig carefully and pointing out these hazards, a Liberty Mutual loss prevention engineer can help you improve your odds against worker injury.

But safety engineering is just the beginning of Liberty's protection in depth. This broad concept in loss control also includes a full-time auditing staff, two rehabilitation centers, a special paraplegic ward, and the diagnostic services of leading orthopedic specialists in 78 cities. At Liberty's research center, technicians study ways to help make machines, methods, and environments safer.

These and other services of Liberty's protection in depth helped save many millions of dollars for Liberty Mutual workmen's compensation policyholders last year. To learn more about Liberty's protection in depth (and how it can save *you* money), just call the nearest Liberty Mutual office.

Look for more from

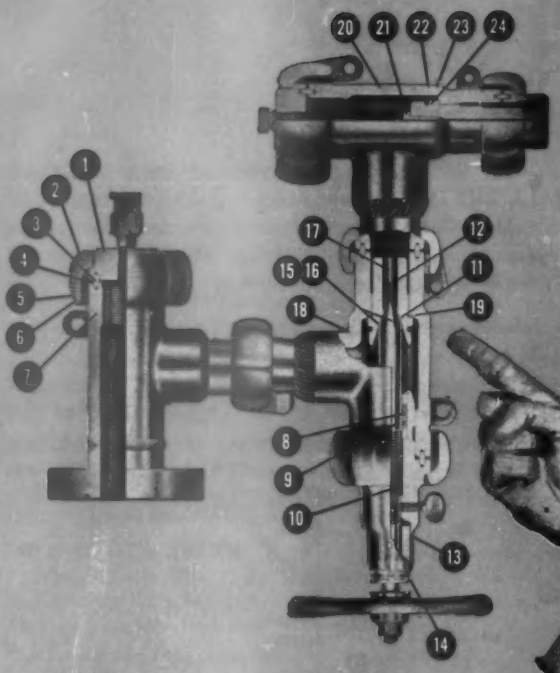
LIBERTY MUTUAL

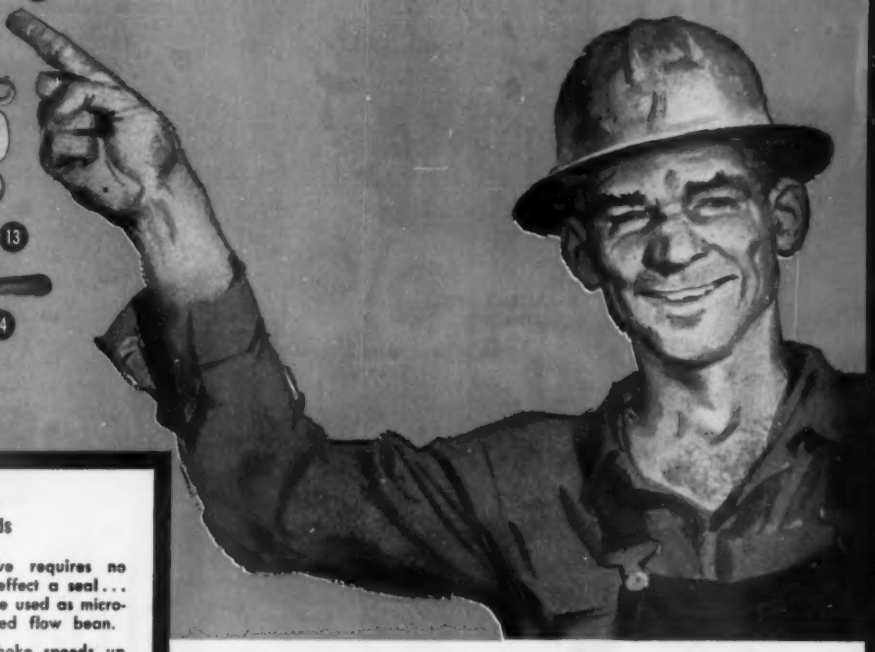
the company that stands by you

LIBERTY MUTUAL INSURANCE COMPANY • LIBERTY MUTUAL FIRE INSURANCE COMPANY • HOME OFFICE: BOSTON

Personal Insurance: Automobile, Fire, Inland Marine, Burglary, Homeowners • **Business Insurance:** Workmen's Compensation, Liability, Group Accident and Health, Fire, Inland Marine, Fleet, Crime

See how much more you get with a UNIBOLT Christmas tree flow manifold

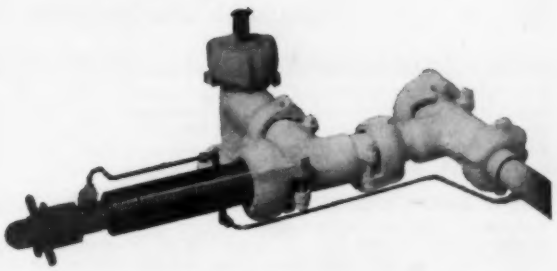




These are the "Extras" that make UNIBOLT the best buy of all manifolds

1. Tee cannot be accidentally opened.
2. No exposed threads . . . no accidental damage.
3. Concealed seat in groove . . . no accidental damage.
4. All metal seat . . . not affected by high or low temperature.
5. Lubricators, bottom hole pressure adapters, and valves easily attached to Unibolt connection.
6. 2"—3000 lb. wp Unibolt 28% stronger than 2" — ser. 900 flange.
7. Unibolt stronger than tubing threads . . . ideal for working trees with welded lift nipple. Tubing threads in tee if desired.
8. Stem packing needs no tightening.
9. Stem turns freely under high pressures.
10. Threads on stem not exposed to external or internal damage.
11. Full 2½" pilot for true stem alignment and rigidity.
12. Streamlined flow — no obstructions . . . no turbulence.
13. Wing Valve requires no grease to effect a seal . . . may also be used as micrometer-gauged flow bean.
14. Variable choke speeds up initial clean-up or running initial flow tests . . . saves rig time.
15. Nitride hardened stem and stem seat . . . resists corrosion.
16. Choice of hard chrome plated or "SA" stainless stems and seats.
17. Unrestricted 1" opening in Wing Valve will pass 10,000 bbls. of fluid per day with 100 lbs. pressure drop.
18. Wing Valve can be completely overhauled without removal from tree.
19. Wing Valve stem seat sealed by power threads and metal gasket assure alignment.
20. Positive Choke Body takes regular or "X" Beans . . . all beans flow-rated.
21. Shaped entrance on beans prevents paraffin clogging.
22. Positive Choke Body may be replaced with inexpensive tee and cage nipple.
23. Positive Choke Body can be converted to Adjustable Wing Valve by substituting two parts.
24. Beans and stem seats have external hex for wrenching.

In addition to these distinctive features, the UNIBOLT Flow Manifold eliminates impingement of flow and negative pressure areas. It may be salvaged completely or as separate units. The three separate units provide flexibility in arrangement of connections. All parts are easily replaced in the field . . . all parts are interchangeable.



The valve in this manfold is the new UNIBOLT Pressurematic Valve which is a combination automatic high-low safety valve and manually-operated wing valve for choke changing.

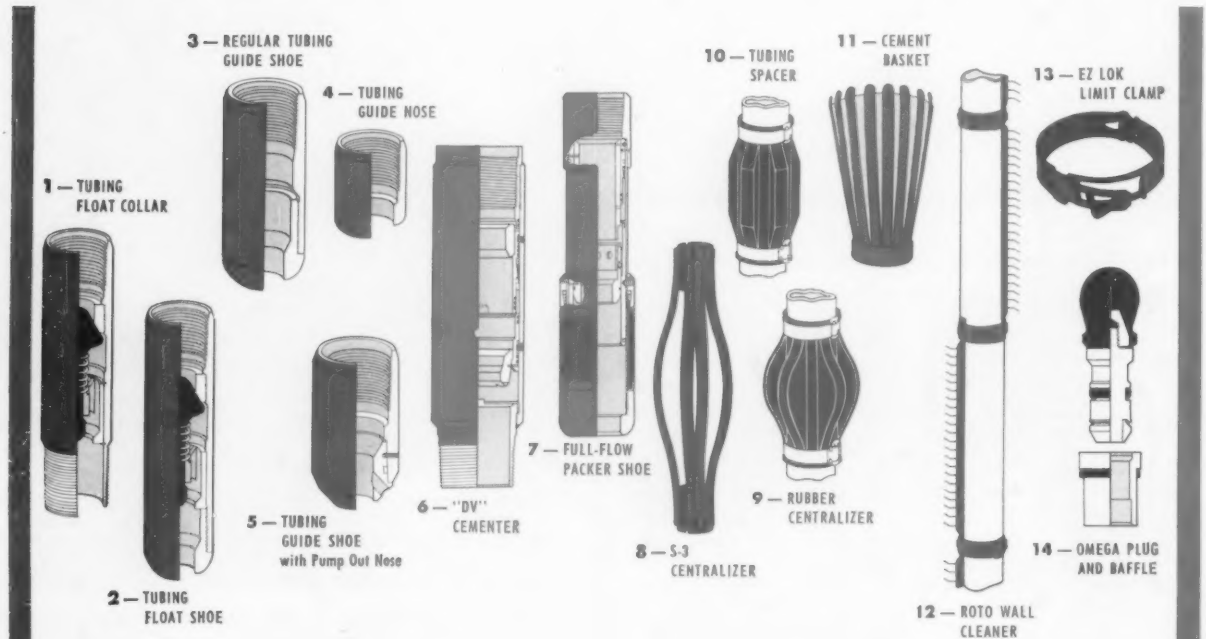
THORNHILL CRAVER CO.

P. O. Box 1184, Houston, Texas

LOOK WHAT IS NEW FOR TUBINGLESS COMPLETIONS!

HALLIBURTON has now developed this complete line of Tubingless Completion Tools. Each one incorporates the dependable features designed into the larger sizes and proved in years of successful service.

In tubingless completions, the tools are scaled down – but Halliburton's services are *full size!* The capable combination of Halliburton men, materials and equipment is backed by nearly 40 years of servicing experience. Whatever you require for tubingless completions – cementing, treating, testing, or remedial services, you'll find exactly what you need when you call Halliburton.


3 — REGULAR TUBING GUIDE SHOE
4 — TUBING GUIDE NOSE
1 — TUBING FLOAT COLLAR
2 — TUBING FLOAT SHOE
5 — TUBING GUIDE SHOE with Pump Out Nose
6 — "DV" CEMENTER
7 — FULL-FLOW PACKER SHOE
8 — S-3 CENTRALIZER
9 — RUBBER CENTRALIZER
10 — TUBING SPACER
11 — CEMENT BASKET
12 — ROTO WALL CLEANER
13 — EZ LOK LIMIT CLAMP
14 — OMEGA PLUG AND BAFFLE

HALLIBURTON CEMENTING TOOLS for tubingless completions

TUBING FLOATING EQUIPMENT **1** and **2** incorporates the Super Seal Valve to help reduce the load on surface equipment and act to prevent cement from backing up after placement. This valve provides full opening through its seat. For 2⅞" and larger sizes, Automatic Fill-Up Attachments are available to allow tubing to automatically fill, thus reducing running-in time.

TUBING GUIDING EQUIPMENT directs the string away from ledges and obstructions in the hole. Regular Tubing Guide Shoe **3** is equipped with a drillable cast aluminum guide nose. The small Guide Nose **4** is of full opening design while the other Guide Shoe **5** is equipped with a pump out nose. Neither 4 or 5 normally requires drilling-out.

TUBING "DV" MULTIPLE STAGE CEMENTER **6** permits placing cement in separate stages to help protect specific intervals for dual zone or multiple completions, to help protect weak or porous formations, and to permit full depth cementing in deep holes.

TUBING FULL-FLOW PACKER SHOE **7** helps protect formation below while cementing tubing or casing. Requires no drilling out after cement placement since internal parts and plug may be pumped free from tool leaving a full opening.

TUBING CENTRALIZERS keep the string centered to help avoid cement channeling. The Model S-3 **8** is equipped with heat treated steel springs to give maximum centering force. The 85 durometer Rubber Centralizer and Spacer **9** and **10** are applied quickly with metal banding. The Spacer is also designed for use in multiple string completions.

COMPANION CEMENTING EQUIPMENT The Cement Basket **11** aids in protecting weak or porous formations by adding support for the cement column. Tubing Roto Wall Cleaners **12** are designed to permit better cement bonding and reduce channeling by cleaning filter cake from the wall bore prior to cementing. EZ Lok Limit Clamps **13** provide "snap-on" locking power to speed the installation of companion equipment without welding.

OMEGA LATCH DOWN PLUG AND BAFFLE ASSEMBLY **14** incorporates a dual purpose top cementing plug that wipes tubing free of cement, and, when latched in its Baffle, provides a back pressure valve effect to help prevent reverse flow of cement.

HALLIBURTON TOOLS for cementing, treating and testing in slim hole and tublingless completions

PACKERS AND BRIDGE PLUGS

SDC SQUEEZE PACKER A , tested to seal up to 10,000 psi differential pressures, is designed to effectively pack-off inside 2⅞" O.D. regardless of depth. Built-in back pressure valve helps prevent reverse flow of cement after squeezing. SDC can be easily converted to a bridge plug if desired.

RTTS PACKER B is a retrievable tool designed to be run inside 2⅞" O.D. and larger tubing for treating, testing and squeezing one or more zones during the same trip. The tool is equipped with a circulating valve and safety joint.

WLC BRIDGE PLUG C is normally set on a wire line to plug a zone for abandonment or treating above the plug. It is made of drillable materials and is designed to effectively hold 10,000 psi differential pressures.

RETRIEVABLE TENSION PACKER D is equipped with its own Circulating Valve. This Packer is set in tension to isolate a zone inside tubing for fracturing, acidizing, squeeze cementing, and other pressure treatments.

CUP TYPE RETRIEVABLE BRIDGE PLUG E is designed to provide a positive but easily removable plug inside tubing to seal against differential pressures. It is especially adaptable to be run below the RTTS Packer to straddle several separate zones for treating, testing or squeezing during one trip into the hole.

TUBING R-3 TREATING PACKER F may be tension-set or inverted for conventional setting inside 2⅞" O.D. tubing to isolate a zone to be treated or produced. This retrievable tool is designed to hold 5,000 psi differential pressures. All parts below the built-in safety joint are drillable.

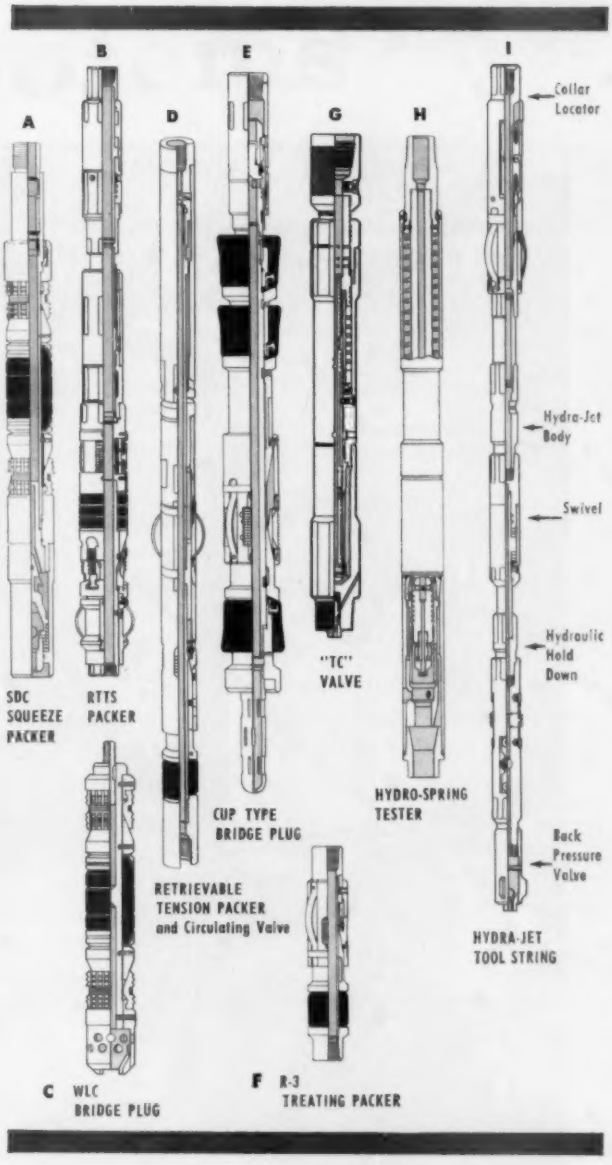
TUBING TESTING TOOLS

TUBING "TC" CIRCULATING AND CLOSED-IN-PRESSURE VALVE G eliminates the need for air chamber in obtaining initial C.I.P. build-up, flow pressure and final C.I.P. All phases of operation require only right-hand drill pipe rotation. Available for running tests in open hole, 3½" I.D. and larger.

TUBING HYDRO-SPRING TESTER H opens easily by slacking off weight. Ease of maintenance and operating simplicity are valuable features of the Hydro-Spring Tester.

TUBING HYDRAULIC ABRASION TOOLS

TUBING HYDRA-JET EQUIPMENT I directs high pressure streams of sand laden fluid to perform such functions as perforating, horizontal or vertical fracture initiation, slotting or cutting tubing, and other remedial work. The string includes a Collar Locator to position the tool, the Hydra-Jet tool with its jetting nozzles, the Tubing Swivel if it is desired to rotate during jetting, a Hydraulic Hold Down and Back Pressure Valve Assembly.



These are the Halliburton Tools that help you extend your savings in tubingless completions. For more information, see your Halliburton man, *today!*

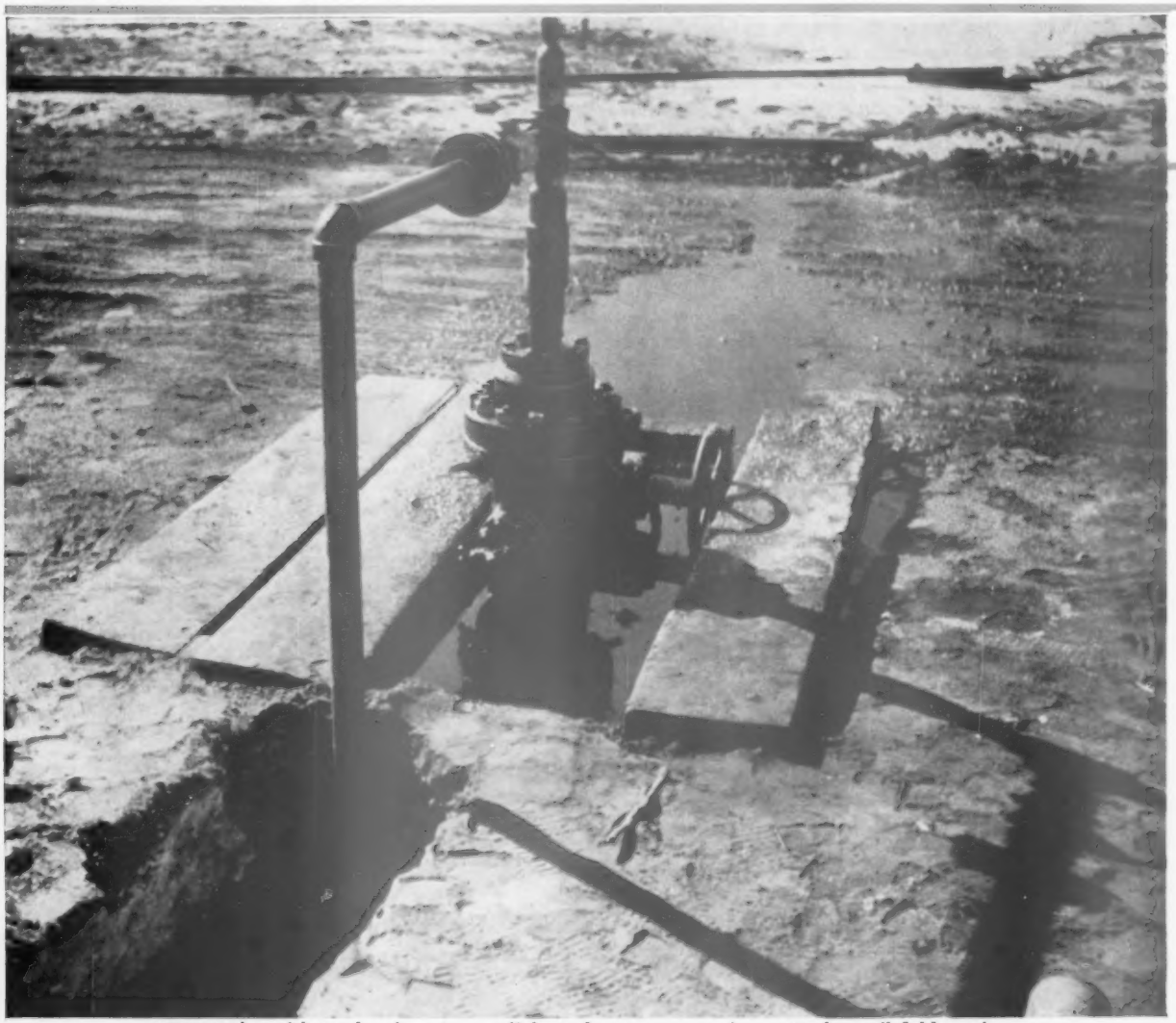
275 Service Centers
. . . just minutes away
from your well

TUBINGLESS COMPLETION TOOLS

Halliburton
COMPANY • DUNCAN, OKLAHOMA

Du Pont Delrin™ pipe

to salt-water



DELRIN pipe withstands salt water, sunlight and exposure . . . gives extra-long oil-field service.

DELRIN™ PIPE

ACETAL RESIN

Manufactured, sold and serviced by Du Pont

brings new efficiency

disposal systems

Costs less per foot, less to install . . . assures lower pumping costs than other types of pipe

You save money in many ways when you choose Du Pont **DELRIN** acetal resin pipe for salt-water disposal systems. First, **DELRIN** pipe costs less per foot than other materials which combine the necessary corrosion resistance and strength needed for these systems.

Next, **DELRIN** pipe saves you money in installation costs. You can lay it on top of the ground, bury it to the depth made by a field plow, or ditch it in, depending upon field conditions. Joints can be made within 25 seconds with no need for precision cutting and threading. Three-men teams can easily average 500-600 feet per minute after ten minutes' practice with the integral heat-joining system. And the line may be immediately pressure tested at 150% of pressure rating upon completion of the last joint.

Finally, **DELRIN** pipe lowers pumping costs because it can handle a greater volume of salt water than other pipes of the same inside diameter. This increased flow is due to the exceptionally low friction loss of **DELRIN**.

Salt-water systems are just one application for versatile **DELRIN** pipe. Here's why it is equally well suited for flow lines, gathering lines, or water-flood lines:

- *It does not lose strength by oil absorption*—an outstanding advantage over other thermoplastic pipes.
- *It has outstanding fatigue endurance*—**DELRIN** pipe will not fail by fatigue in pressure-surging service.
- *It resists paraffin build-up* under most field conditions. If build-up does occur, **DELRIN** pipe can be hot-oil treated, or cleaned by scraping with "bugs" or "pigs" without damage.

DELRIN pipe has been tested in over six years of laboratory work by Du Pont and by over three years of field installations in various oil-producing areas of the country. It is now available in a range of sizes and pressure ratings to meet your requirements.

MAIL COUPON FOR FULL DETAILS, including engineering specifications and detailed analysis of various field installations. You will receive full information on all sizes and prices of **DELRIN** pipe and the location of your local Du Pont technical representative serving the oil industry.

DU PONT

BETTER THINGS FOR BETTER LIVING
. . . THROUGH CHEMISTRY

Polychemicals Department, Du Pont Company
Dept. OG-11 Room 2507P, Nemours Building
Wilmington 98, Delaware

Please send me complete information on **DELRIN PIPE** for oil-field installations.

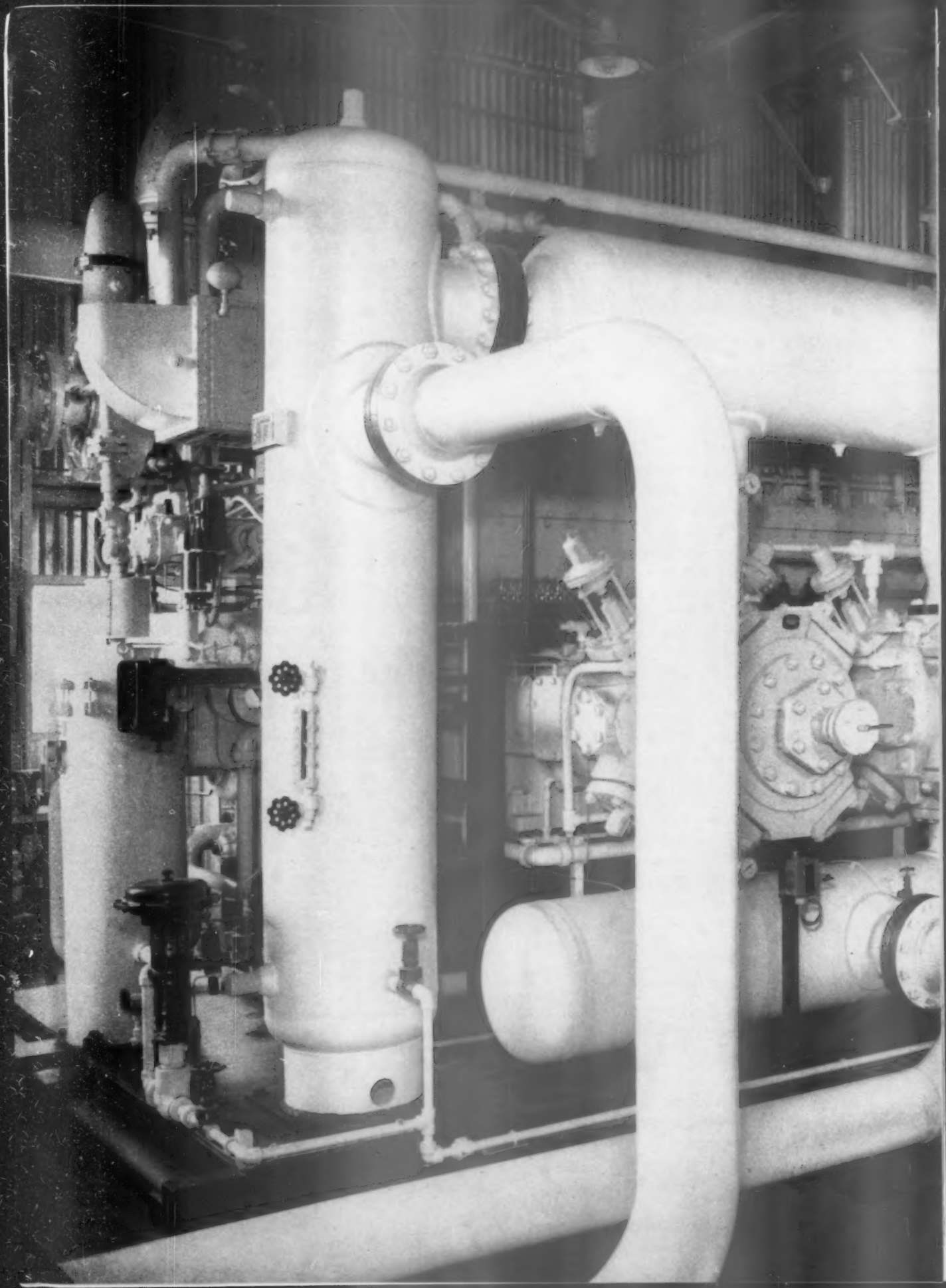
Name_____

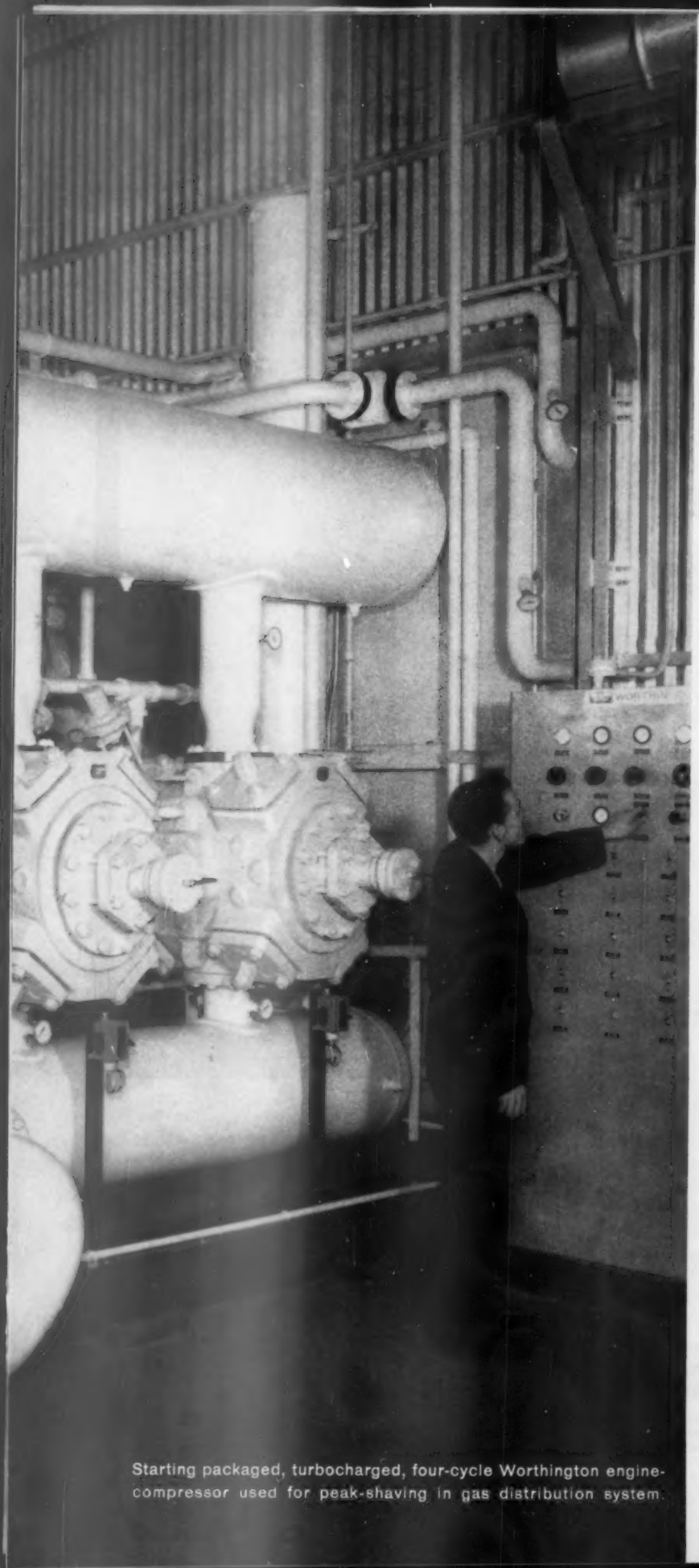
Position_____

Firm Name_____

Street Address_____

City_____ State_____





Starting packaged, turbocharged, four-cycle Worthington engine-compressor used for peak-shaving in gas distribution system.

SLHC'S RE-ORDERED TO HELP KEEP DENVER WARM

This winter two more Worthington SLHC engine-compressors will be standing by to help Denver and vicinity through the cold snaps. Then four 575-hp and one 950-hp unit will be ready to respond to 17-mile-away remote control, when normal pipeline capacity is at maximum.

Seventeen miles from Denver, Public Service Company of Colorado is converting an abandoned mine to ultimately store 3 billion cubic feet of gas. During low-load periods, the spare capacity of the present transmission pipeline will be shunted to the mine to charge it to its maximum capacity and pressure—well below normal pipeline pressure.

When the cold snaps hit, Public Service will operate the five Worthington SLHC's to return the gas to its distribution system. First, they will run in parallel on one-stage operation. Then, as the mine pressure falls, automatic controls will switch the system to two-stage by properly sequencing the engine load controls and station yard valves.

There are four basic reasons why the Worthington SLHC's are selected. First, they have excellent performance under the varying torque and speeds encountered on this job. Second, they show the best fuel economy in their class—7000 BTU/bhp/hr at full load. Third, Worthington experience readily adapted them to full pneumatic automation. And fourth, they have a proven record of reliability so essential for the all-out effort they must make in the cold-snaps.

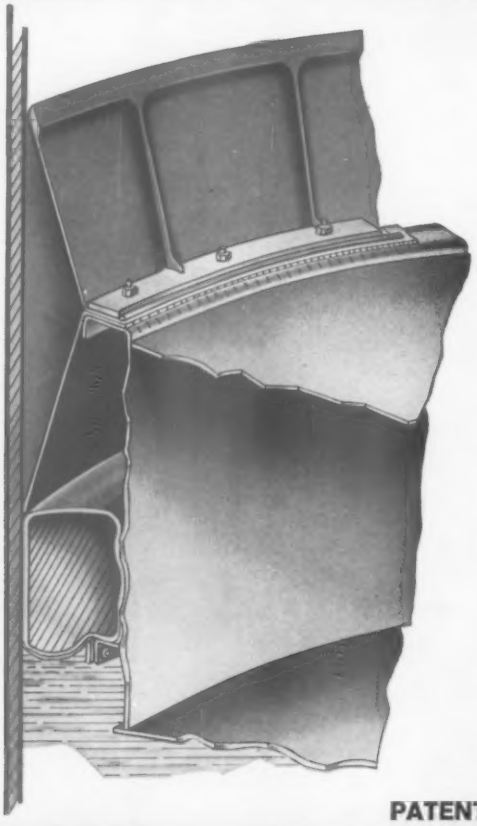
Today, for any under-1000-hp engine-compressor application you should consider the Worthington SLHC. By most value standards, it is the best available today. FOR FURTHER INFORMATION, please write Worthington Corp., Dept. 38-1, P. O. Box 953, Buffalo 5, New York, In Canada, Worthington (Canada) Ltd., Brantford, Ontario.

WORTHINGTON

PRODUCTS THAT WORK FOR YOUR PROFIT

ALL FLOATING ROOF TANKS ARE FULLY EQUIPPED, **BUT...**

Only Tubeseal Has Lightning-Proof, Electro-Conductive Weather Shield



PATENTED

Tubeseal electro-conductive weather shields are an *exclusive tried and proved development*. They provide positive protection against lightning-caused rim fires. ■ How? By maintaining a *continuous* grounding bond between roof deck and shell—concentration of static charges is impossible. There has *never* been a lightning fire where any of the many hundreds of Tubeseal System Floating Roof Tanks are installed throughout the world—they're "lightning proof." ■ This is scientific and safe storage protection for the entire range of volatile products. Tubeseals can be installed on any of your tanks—new, old, riveted, or welded. You owe it to the future safety of your conservation facilities to investigate. Send for the Tubeseal Bulletin now—it could be important.

PDM

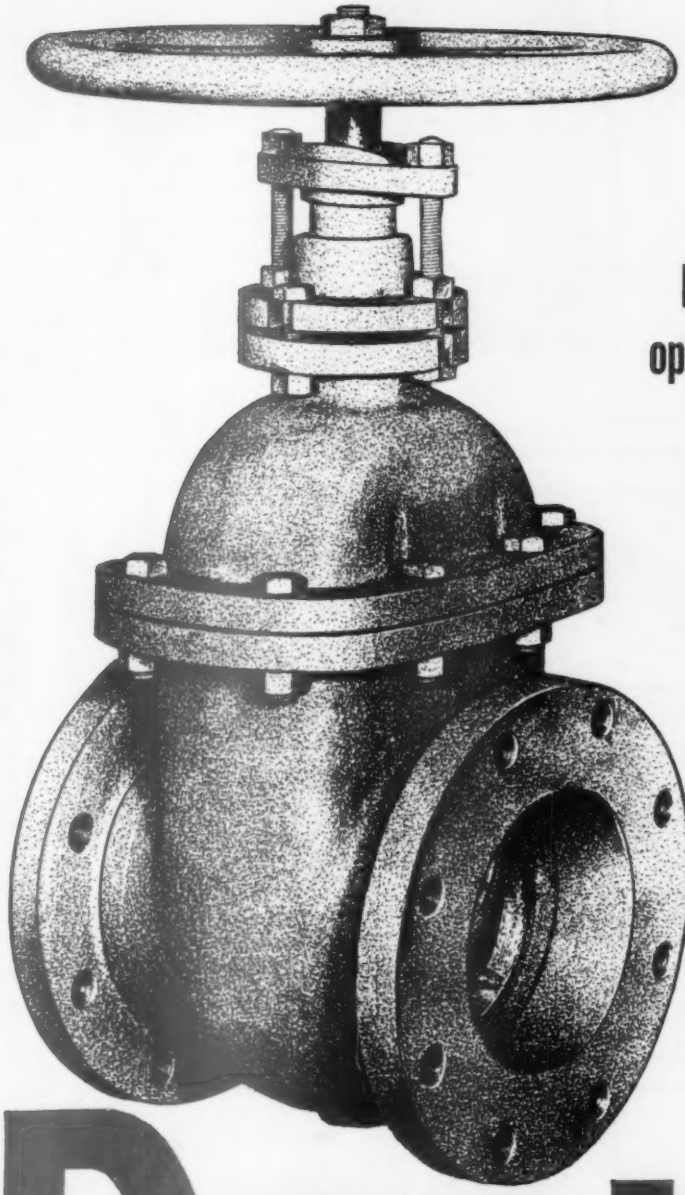
Pittsburgh-Des Moines Steel Company

12 plants to serve you coast to coast

HAMONDTANK

PITTSBURGH, WARREN, BRISTOL, PA. • BALTIMORE • BIRMINGHAM • DES MOINES
PROVO, UTAH • CASPER, WYO. • SANTA CLARA, FRESNO, STOCKTON, CALIF.

Sales Offices: Atlanta 5 • Baltimore 26 • Boston 10 • Bridgeport 5 • Chicago 3 • Dallas 1 • Denver 2 • Des Moines 8 • El Monte • Fresno • Jacksonville • Los Angeles 57 • Newark 2 • New York 17 • Pittsburgh 25 • Sacramento • Santa Clara • Seattle 1 • Stockton licensees and sales offices in many foreign countries including Argentina, Chile, Australia, Belgium, Brazil, Canada, Colombia, England, France, Haiti, India, Italy, Japan, Mexico, Netherlands, Peru, Puerto Rico, Sweden and W. Germany.



Dependable Darling Gate Valves open fully, close tight—with ease

The fully revolving double disc parallel seat and wedge design minimizes friction, avoids concentration of wear, and automatically compensates for valve seat deflection.

Gate discs are independently hung and free to revolve. They change their seating position at each closing. All working parts are perfectly plain. There are no pockets to collect sediment or prevent free and easy movement.

For assured ease of operation, minimum maintenance, long trouble-free service life, *you can depend on Darling*. Our engineers are always glad to assist you in determining the right valves for your service conditions. Darling Catalog No. 57 gives complete specifications. Write for your copy today.

DARLING VALVE & MANUFACTURING CO.
Williamsport 1, Pa.

Sandilands Valve Manufacturing Co., Ltd., Galt 19, Ontario, Canada
Vannes Darling-France, 23 rue du Commandant Mouchotte, St. Mandé, France

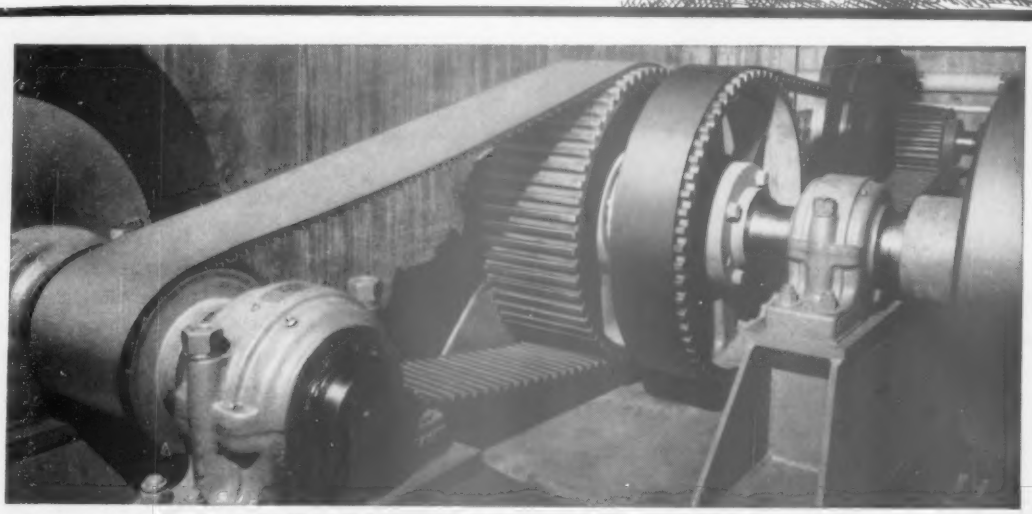
YOU CAN DEPEND ON

DARLING

TRADE DARLING MARK

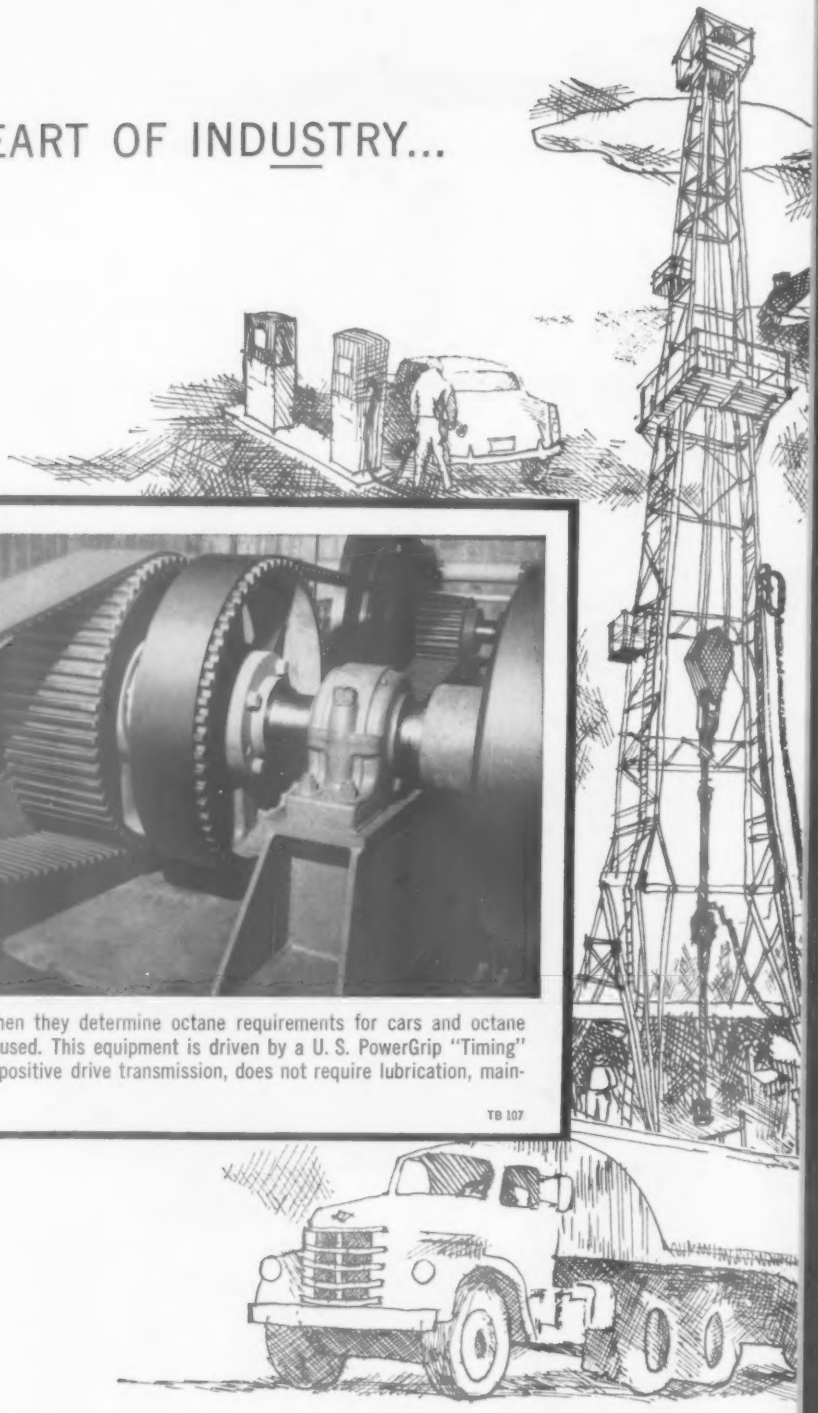
GATE • BUTTERFLY • CHECK • SPECIAL VALVES • FIRE HYDRANTS

US AT THE HEART OF INDUSTRY...



Nothing is left to chance by Sun Oil Company when they determine octane requirements for cars and octane ratings of fuels. Highly precise scientific equipment is used. This equipment is driven by a U. S. PowerGrip "Timing" Belt. This belt was a must because it gives foolproof, positive drive transmission, does not require lubrication, maintenance, or attention.

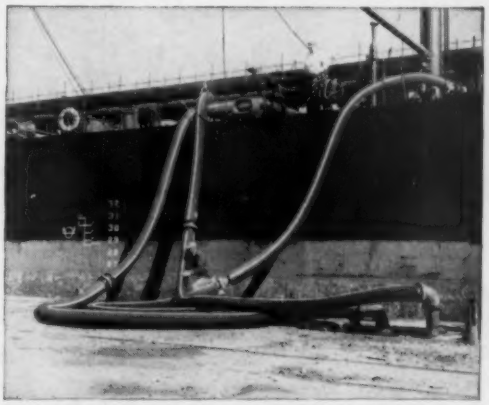
TB 107



Wherever the refining industry and its related affiliates operate, you'll find U.S. Rubber Industrial Rubber Products helping them to function more efficiently...more profitably, helping to shorten the path to even more outstanding developments and products.

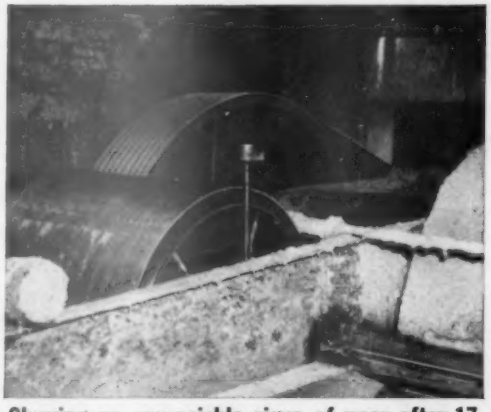
"Permobond lining should last 7 times longer on our 100,000-gallon hydrofluorosilicic acid storage tanks," says the superintendent at Kaiser Aluminum's Mulberry, Fla., plant. U.S. Permobond® linings are expected to last 15 to 20 years, are especially suited for highly corrosive "problem" chemicals, can be applied to both existing and new equipment.

TL 101



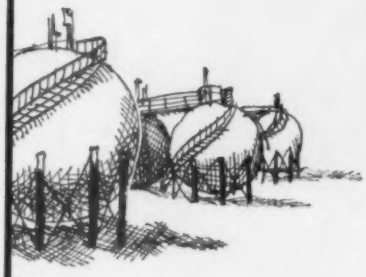
Vital link between tanker and shore-side storage facilities, U.S. Oil Suction and Discharge Hose is used by practically every major oil company, most barge operators, large and small. It combines toughness, flexibility, and relatively light weight with excellent resistance to the widest variety of fuels. U.S. Amazon® hose is made in sizes and types to fit every loading or unloading need.

H 119



Showing no appreciable signs of wear after 17 years of hard usage carrying power to the John A. Manning Paper Company's beater drive, this set of U.S. Royal V-Belts looks good for many more years of service. Known for maximum reliability and safety, U.S. Royal V-Belts provide top efficiency, exceptional length stability, and long service life for all types of drives.

VB 111

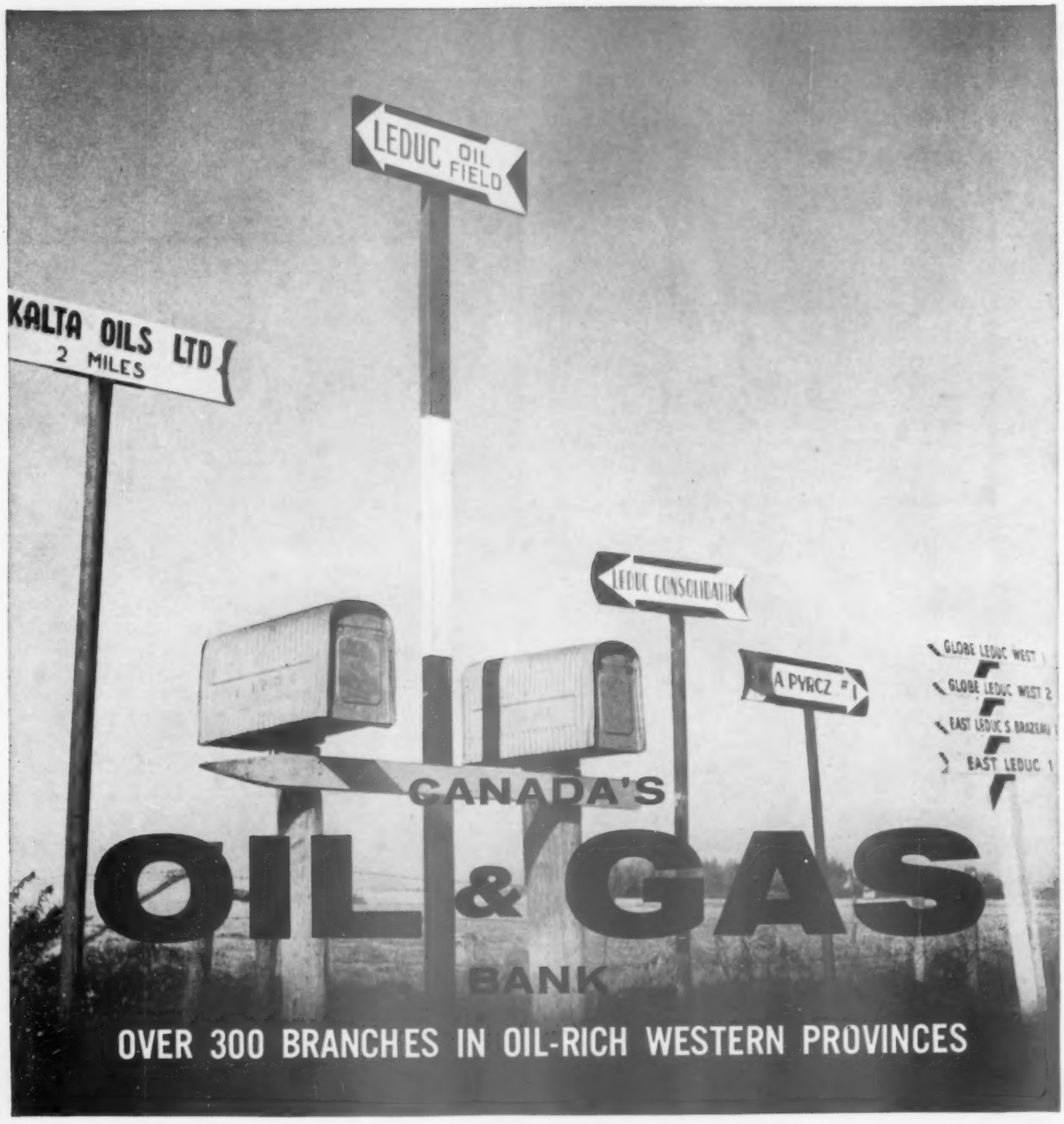


For every industrial rubber product need, turn to US. For Conveyor Belts, V-Belts, the original PowerGrip "Timing"® Belt, Flexible Couplings, Mountings, Fenders, Hose and Packings . . . custom-designed rubber products of every description. Discover why U.S. Rubber has become the largest developer and producer of industrial rubber products in the world. See your U.S. Rubber Distributor or contact US directly at Rockefeller Center, New York 20, N. Y.

WORLD'S LARGEST MANUFACTURER OF INDUSTRIAL RUBBER PRODUCTS

United States Rubber

MECHANICAL GOODS DIVISION



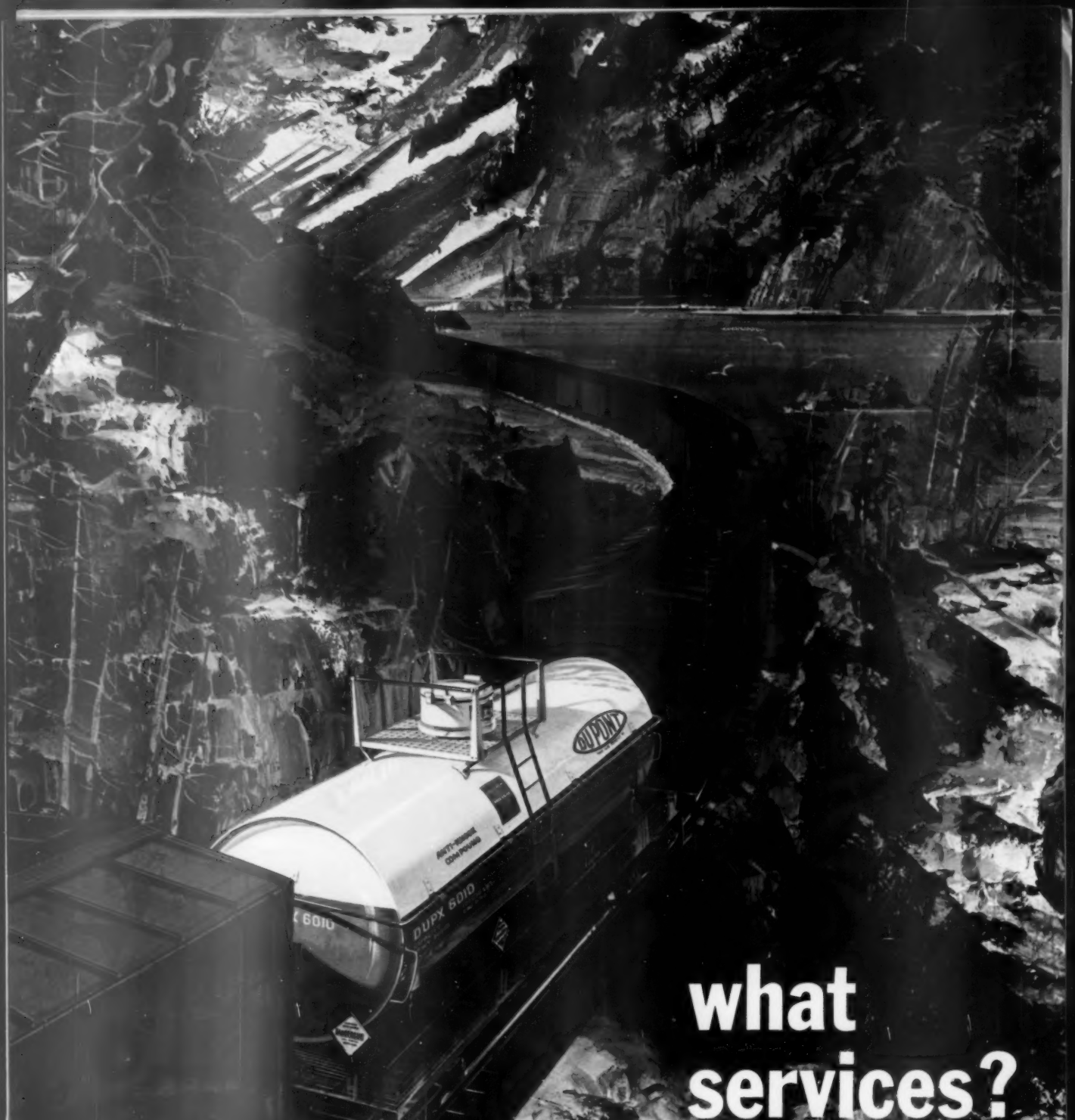
Every banking facility is available to oil and gas men through this bank's branches in Western Canada or through our Oil and Gas Department in Calgary. In addition, our Department in Calgary offers special Oil and Gas Bulletins.

These reports, periodically revised, are of great practical value to those entering the industry, as well as to those already established. For available copies of these bulletins covering regulations, tariffs, statistics, financing and other related topics, apply to our Dallas representative, Mr. T. C. Marshall, Room 1523, 300 North Ervay Street, Dallas, Texas; or to The Royal Bank of Canada, Oil and Gas Department, 409 Eighth Avenue West, Calgary, Alberta.

We do not provide information on oil securities.

THE ROYAL BANK OF CANADA

Head Office: Montreal • New York Agency: 68 William St., New York 5, N. Y. • Dallas Representative: T. C. Marshall, Room 1523, 300 N. Ervay St.
Assets exceed 4 billion dollars • Over 1,000 Branches in Canada, the Caribbean Area and South America • Offices in New York, London and Paris



what services?

The technical, training and marketing services that this tankcar represents are a bonus that users of Du Pont antiknocks find as valuable to them as the antiknocks are to their gasolines. Helping you profit from these services is another practical advantage of doing business with Du Pont.

E. I. du Pont de Nemours & Co. (Inc.), Petroleum Chemicals Division, Wilmington 98, Delaware.

ANTIKNOCKS and other PETROLEUM ADDITIVES DUPONT

Better Things for Better Living . . . *through Chemistry*

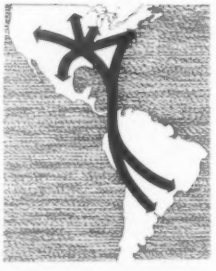
"You'll make it easily, sir . . . we're right on time!"

Braniff hostesses, like Lisa Stegmann above, almost always have good news for passengers who "can't be late." Braniff, as veteran passengers will tell you and government statistics prove, is a leader in on-time records.

"On-timeliness" is just one of many Braniff bonuses. Consider, for example, our Silver Service meals . . . the "looked-after" feeling you get from charming Braniff hostesses . . . and all the other friendly Braniff folks who serve you from start to destination. Yes, and the luxury of Braniff's new El Dorado Super Jets.

Men in the oil and gas industries also appreciate our extensive schedule of jet flights between Texas and New York, Chicago, Denver, and Mexico. Actually, Braniff serves 50 U.S. cities, and from Texas or New York/Miami (via Braniff-Eastern thru-jet service), 10 Latin American countries.

Your air freight shipments will also receive the same prompt care and attention.



BRANIFF *International* AIRWAYS

General Offices: Dallas, Texas

Keep your operating figures.....

in the black . . . .

. . . with cost-cutting
quality equipment from
Jones & Laughlin Supply Division

Drilling contractors . . . . . .

J.L.

SUPPLY

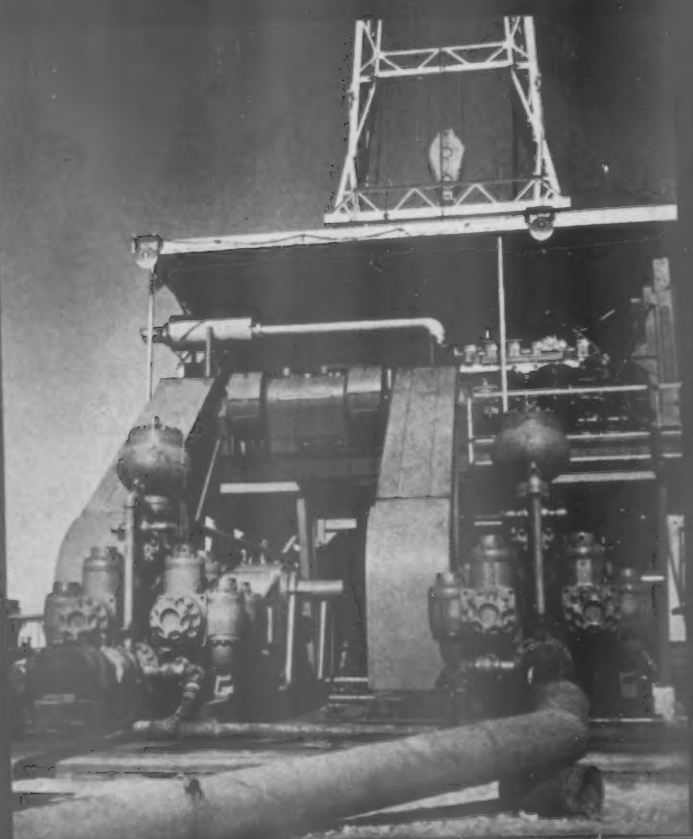
. . . here's J&L teamwork!

Expert teamwork goes with J&L drilling equipment. Parts and service are made readily available, and J&L men take an active interest whenever and wherever the rig moves in.

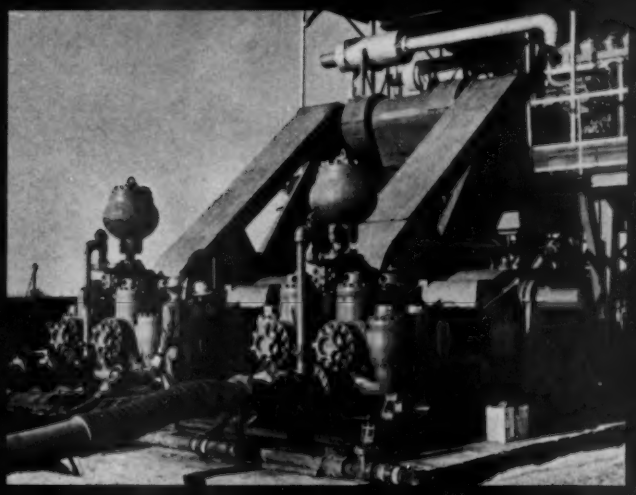
Your files should include the latest general information and engineering data on Gardner-Denver mud pumps and parts, J&L drill pipe, rotaries, drawworks, blocks, compounds, masts ...even expendable items such as J&L wire rope. Call your local J&L Supply man now, or write us at Tulsa.

Jones & Laughlin Supply Division « Tulsa

Ask J&L Supply about . . .



J&L SUPPLY



. . . Gardner-Denver pumps
Gardner-Denver parts
Gardner-Denver service

Drilling crews often find their nearest neighbors to be jack rabbits, coyotes and sidewinders. At night their rig lights may be the only sign of human activity for fifty miles.

Dependable equipment is essential. So more and more drilling contractors have standardized on Gardner-Denver mud pumps.

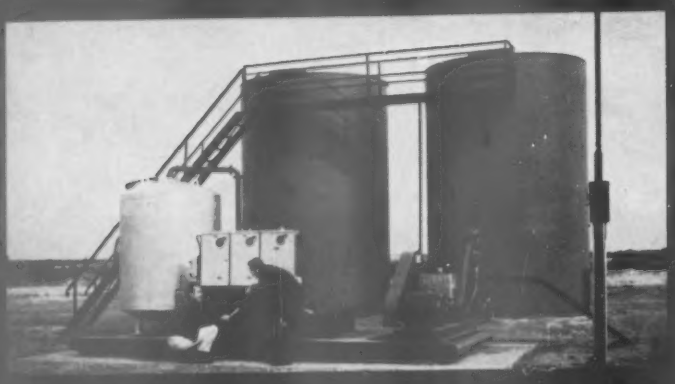
When service is required, the Gardner-Denver pump can generally be repaired in the field with parts quickly available from a local J&L Supply store.

And it's wise to insist on genuine Gardner-Denver parts to put a pump in like-new condition.

Complete information on any Gardner-Denver pump is available from your local J&L Supply man, or from our Tulsa office.

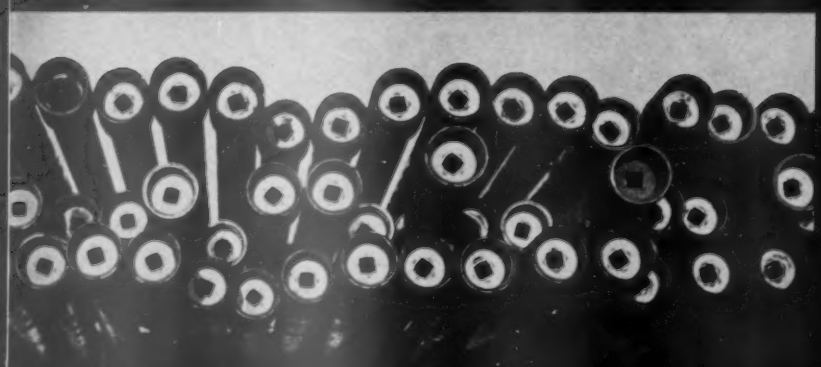
Jones & Laughlin Supply Division « Tulsa

Helpful bulletins on.....



. . Portable waterflood units
Cabot pumping units
J&L casing and tubing

Production costs can be cut with J&L equipment. If it's sold by J&L . . . it's the best available, and in every instance information is ready showing how and why. Call your local J&L Supply man or write us at Tulsa.



J&L SUPPLY

Jones & Laughlin Supply Division « Tulsa

JL SUPPLY

MAC RE

Jal-Con-Weld "50"
High Strength
High Performance
Low Price

ARONI PORT

Why has Jal-Con-Weld "50", the original high strength welded macaroni tubing from Jones & Laughlin Supply Division gained wide acceptance in record time?

Because Jal-Con-Weld "50" offers a 50,000 pound psi minimum yield strength, yet is priced well below conventional high strength tubing.

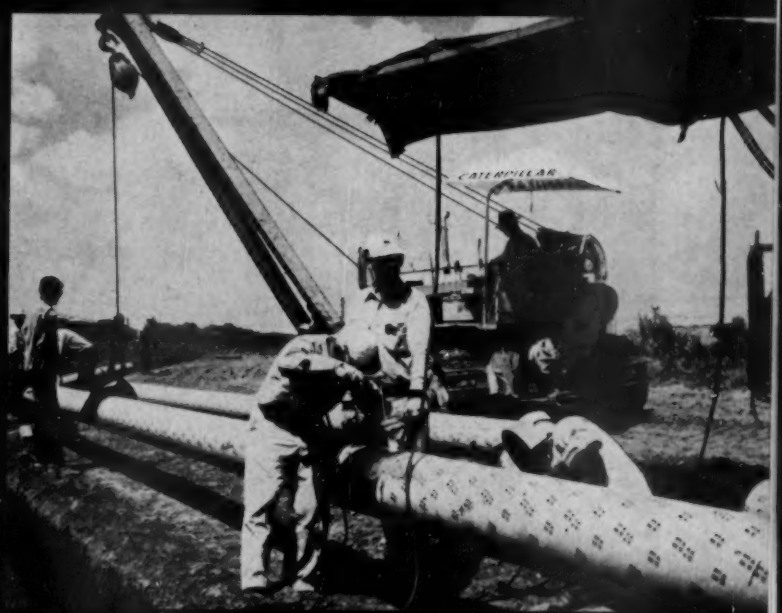
Call your local J&L Supply man for all your macaroni tubing requirements, or write us at Tulsa.

Jones & Laughlin Supply Division « Tulsa

J.L

SUPPLY

Quality checks pay



off on the right-of-way

Additional Jones & Laughlin tests and advanced mill practices guard the quality of J&L line pipe. The pipe is easy to bend, line up, and weld.

Ask for technical data and prices on J&L line pipe, Rockwell plug valves, and Taylor Forge welding fittings. If it's sold by J&L it's the best available. Call your local J&L Supply man—or write us at Tulsa.

Jones & Laughlin Supply Division—Tulsa

Improved Kellogg Techniques Provide Increased Creativity in New Plant Design . . .

1 Many of the computer programs in Kellogg's extensive library have been developed jointly by process engineering and computer specialists.

More efficient engineering and sounder new plant investments will result from use of a new high-speed IBM 7070 computer installed at The M. W. Kellogg Company's headquarters in New York.

The new computer and improved programming techniques mark another major stride in Kellogg's continuing improvement of its engineering services. Its speed makes practical rigorous calculation and the evaluation of multiple solutions to difficult design problems—a vital step in achieving the most economic design.

The computer's large capacity will enable Kellogg to develop new methods which can be applied to plant engineering problems. In addition, it will permit Kellogg to broaden its present activities in such areas as computer control, process dynamics, and systems engineering.

New engineering techniques and increased engineering efficiency are vital to the creation of optimum plants. If you are planning a new plant, Kellogg engineering services, more than ever, can help you achieve optimum plant design and a more economic investment.

2 Engineering data and computer commands, punched on cards and stored on magnetic tape, are read into the computer.

3 A printout provides engineering data ready for evaluation. Simplified methods permit ready use of computer for solving a wide range of process and mechanical design problems.

THE M. W. KELLOGG COMPANY

711 Third Avenue, New York 17, N.Y.
Subsidiary of Pullman Incorporated

THE CANADIAN KELLOGG COMPANY, LIMITED, TORONTO
KELLOGG INTERNATIONAL CORPORATION, LONDON
SOCIETE KELLOGG, PARIS
DEUTSCHE KELLOGG INDUSTRIEBAU G.m.b.H., DUSSELDORF
KELLOGG PAN AMERICAN CORPORATION, BUENOS AIRES
COMPANIA KELLOGG DE VENEZUELA, CARACAS
COMPANHIA KELLOGG BRASILEIRA, RIO DE JANEIRO

BEHIND THE MACHINE

Advanced designs; a wide range of types and sizes; high performance figures; these are the results of over twenty years' experience of design, research and manufacture of gas turbines by AEI engineers.
AEI gas turbines have been installed in aircraft and merchant ships and in frigates and destroyers of the Royal Navy. Industrial machines are suitable for every mechanical drive application as well as power generation, and they have output ratings of 1,750 kW and upwards.

The picture shows work on the rotor of an L21C gas turbine being built for the Basrah Petroleum Co. Larger machines of similar design —the L51C—were recently installed in Iran to supply power for the electrification of the Gach Saran oilfield.

Produced by AEI Turbine-Generator Division, Britain's largest manufacturer of turbine-generators.

AEI Associated Electrical Industries Export Ltd

33 GROSVENOR PLACE, LONDON SW1

B/L003/I

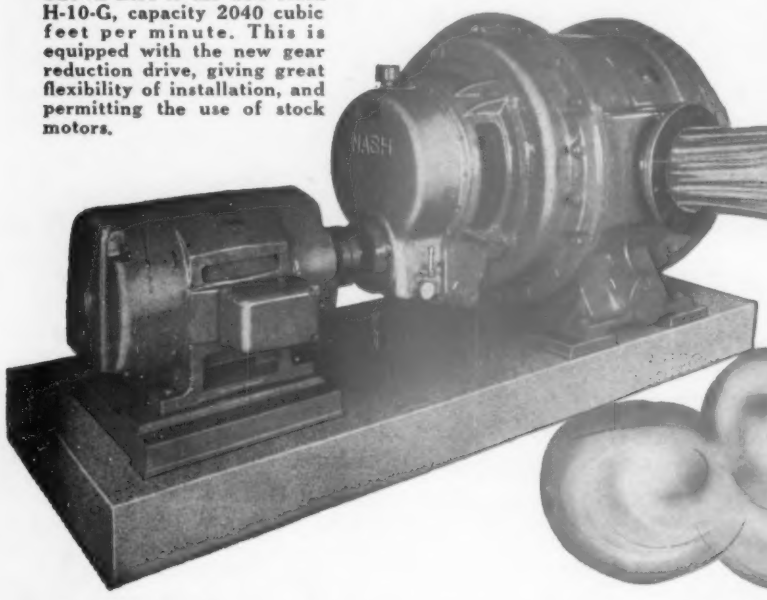
Nash Compressors Tame "Hard-to-handle" Corrosive Gases

The reasons for the success of Nash Compressors in handling "dirty" and corrosive gases are simple. First, Nash Compressors have no internal parts in wearing contact, or requiring close tolerances and internal lubrication. Second, because of the Nash operating principle, a variety of liquids can be employed as the compressant medium, protecting the interior from corrosive action. Third, the pump casing may be fabricated from a variety of special metals and alloys. That is why Nash Compressors take these rugged jobs in stride.

Nash Vacuum Pumps offer the same basic advantages when handling corrosive gases, and reliably maintain vacuums up to 29.50 inches of mercury.

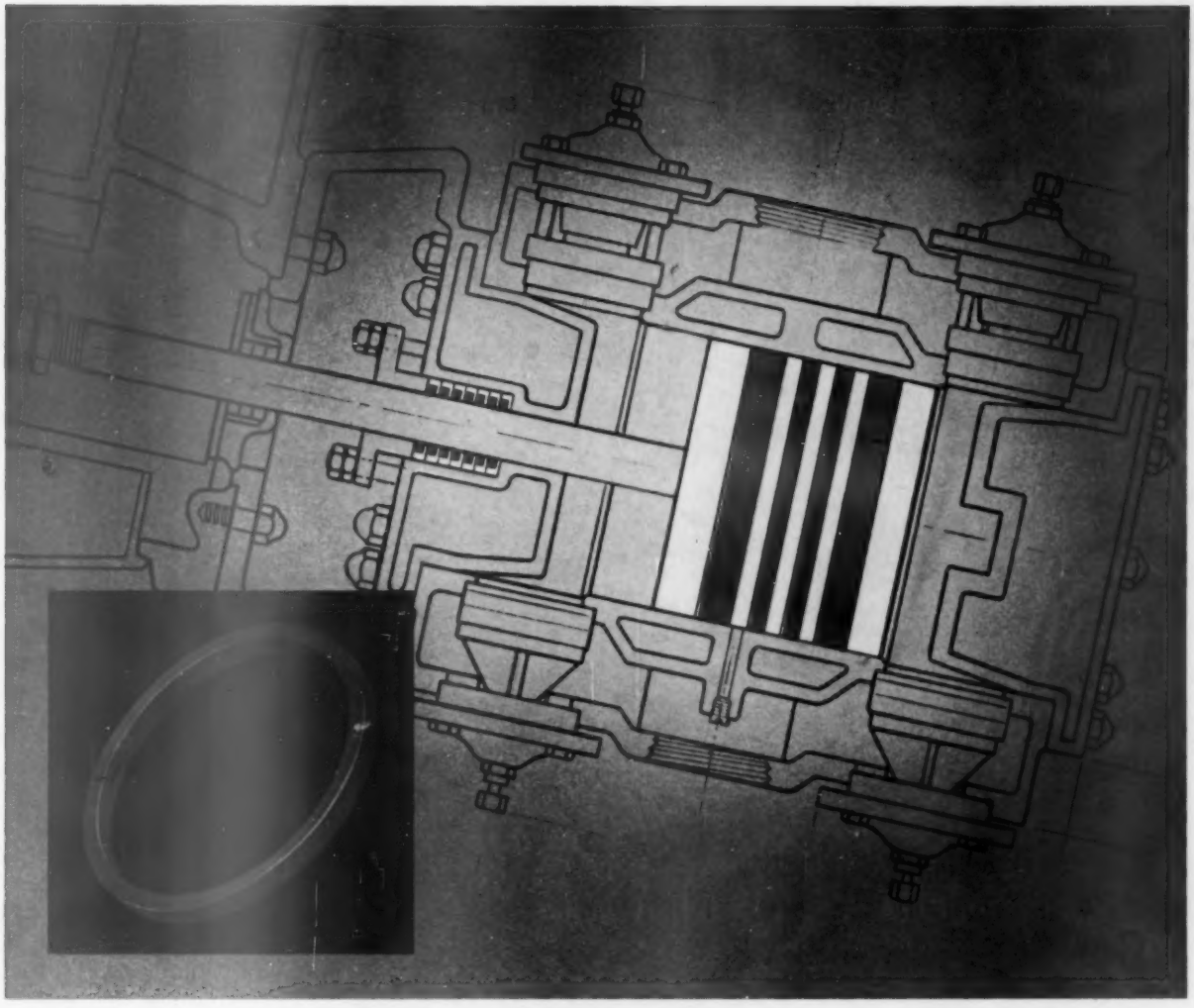
ACETONE
ACETYLENE
AMMONIA
ARGON
BUTADIENE
CARBON DIOXIDE
CARBON MONOXIDE
CHLORINE
ETHYL CHLORIDE
FLUE GAS
FURFURAL
HEXANE
HELIUM
HYDROGEN
HYDROGEN SULPHIDE
NITROGEN
OXYGEN
PHOSPHOROUS PENTOXIDE
SULPHUR GAS
VINYL ACETATE
VINYL CHLORIDE
AND MANY OTHERS

Shown here is the new Nash H-10-G, capacity 2040 cubic feet per minute. This is equipped with the new gear reduction drive, giving great flexibility of installation, and permitting the use of stock motors.



NASH ENGINEERING COMPANY

SOUTH NORWALK, CONNECTICUT, U. S. A.



How piston rings of TEFLON® saved $1,600 per year in compressor maintenance alone

In a plant manufacturing chemical intermediates, a two-stage compressor handled ethyl chloride. In this service, standard carbon piston rings required constant lubrication and maintenance during their average life of 2,000 hours. Conversion of this unit to piston rings of a TEFLON TFE resin had dramatic results. These rings operated for 10,000 hours without maintenance. Lubrication and product contamination were eliminated. On this one compressor, the plant saved $1,600 in maintenance costs alone.

Piston rings of TEFLON are your most logical and economical choice whenever reduced lubrication would be desirable . . . whenever problems of oil contamination arise . . . whenever ring brittleness causes handling, installation or operating difficulties. If you are buying a new compressor, specify rings and packings of a TEFLON TFE resin. To convert your present equipment, check with your compressor manufacturer or qualified ring supplier for engineering and design assistance. For further information, write: E. I. du Pont de Nemours & Co. (Inc.), Dept. OG-11, Room 2526, Wilmington 98, Del.

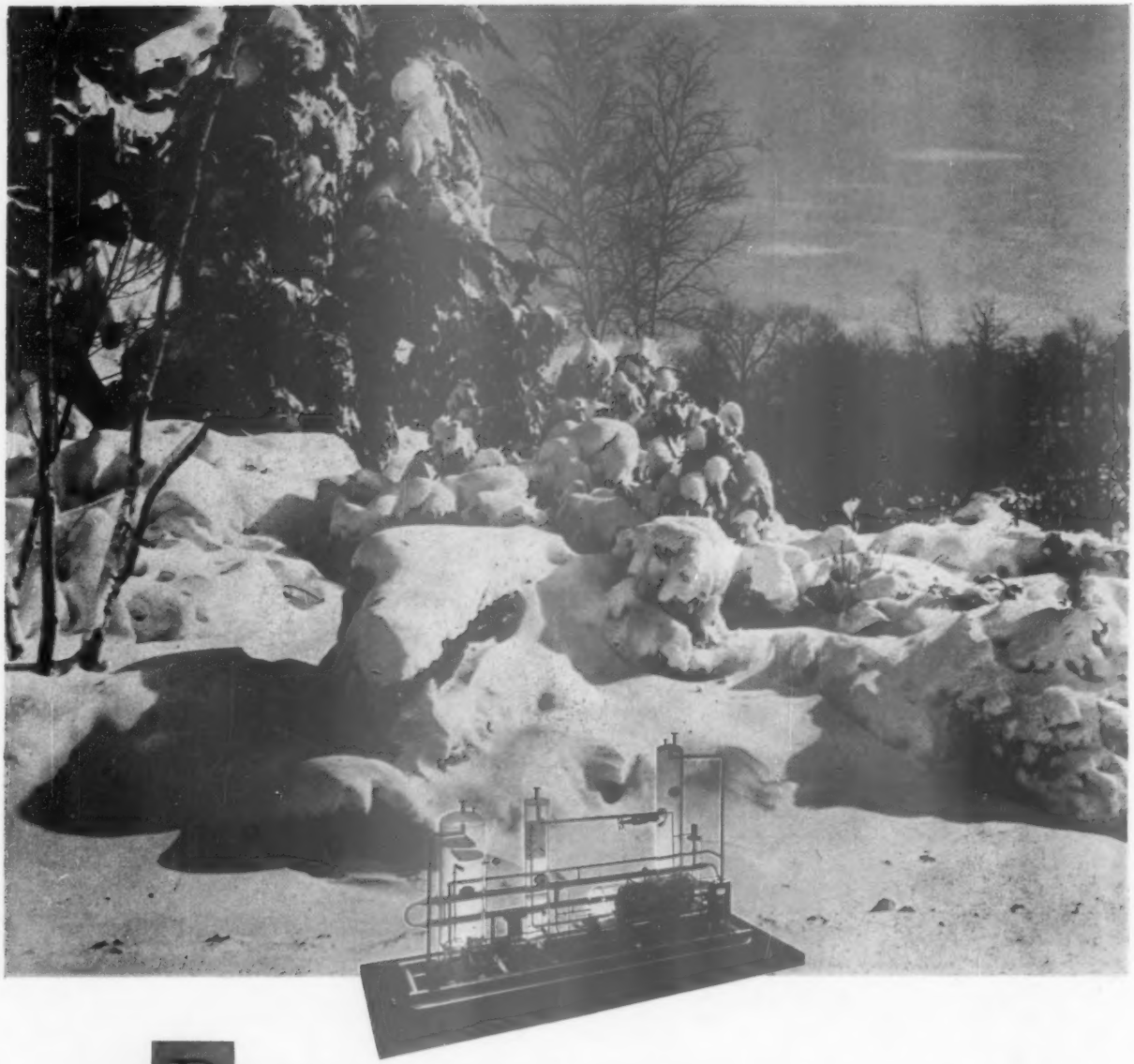
In Canada: Du Pont of Canada Limited, Box 660, Montreal, Quebec.

DU PONT REG. U.S. PAT. OFF.

TEFLON®
FLUOROCARBON RESINS

TEFLON is Du Pont's registered trademark for its family of fluorocarbon resins, including TFE (tetrafluoroethylene) resins and FEP (fluorinated ethylene propylene) resins.

BETTER THINGS FOR BETTER LIVING . . . *THROUGH CHEMISTRY*



PERPETUAL WINTER It is always winter in the separation vessel of a Parkersburg HYRECO* Low Temperature Separation Unit. Chilled by the natural refrigeration of expanding gas, most of the water vapor and liquefiable hydrocarbons are efficiently removed from the well flow stream — automatically and with minimum attendance.

The exclusive Parkersburg "T-Bone" cold separation vessel combines the good points of vertical and horizontal vessels. The gas is dehydrated to better than pipeline specifications and a greater volume of salable condensate is recovered than is possible with conventional separation. As a matter of fact, the additional hydrocarbon recovery will usually pay out the unit in a short time.

Wherever there is oil and gas, there is a Parkersburg man. Call him for all the equipment you need from Wellhead to Pipeline.

Ask your Parkersburg representative for the full story.

Parkersburg

Division of Parkersburg-Aetna Corp.

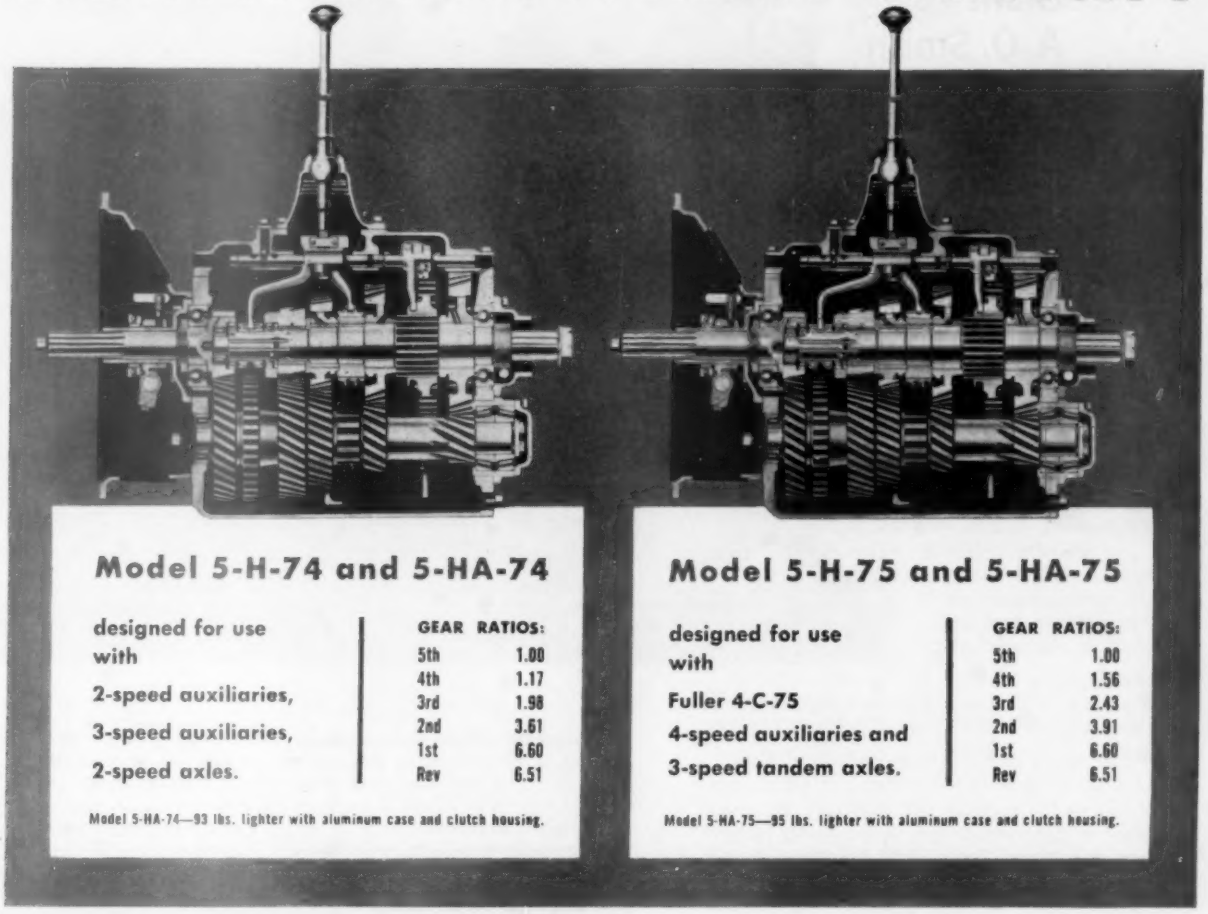
HOUSTON • COFFEYVILLE • PARKERSBURG

*PARKERSBURG Trademark Patented

NEW FULLER 5-SPEED TRANSMISSIONS

for diesel engines 195 to 250 hp

LIGHTWEIGHT . . . HIGH CAPACITY



Model 5-H-74 and 5-HA-74

designed for use with 2-speed auxiliaries, 3-speed auxiliaries, 2-speed axles.

GEAR RATIOS:	
5th	1.00
4th	1.17
3rd	1.98
2nd	3.61
1st	6.60
Rev	6.51

Model 5-HA-74—93 lbs. lighter with aluminum case and clutch housing.

Model 5-H-75 and 5-HA-75

designed for use with Fuller 4-C-75 4-speed auxiliaries and 3-speed tandem axles.

GEAR RATIOS:	
5th	1.00
4th	1.56
3rd	2.43
2nd	3.91
1st	6.60
Rev	6.51

Model 5-HA-75—95 lbs. lighter with aluminum case and clutch housing.

- Extremely high capacity-to-weight ratio
- Ideal gear ratios
- Wide gear faces
- Mainshafts of greater diameter
- High-capacity pilot bearings
- Helical gearing
- Jaw clutch engaged—for easy shifting

For maximum versatility and reliability in your operation, Specify the Model . . . SPECIFY

FULLER TRANSMISSION DIVISION

EATON MANUFACTURING COMPANY

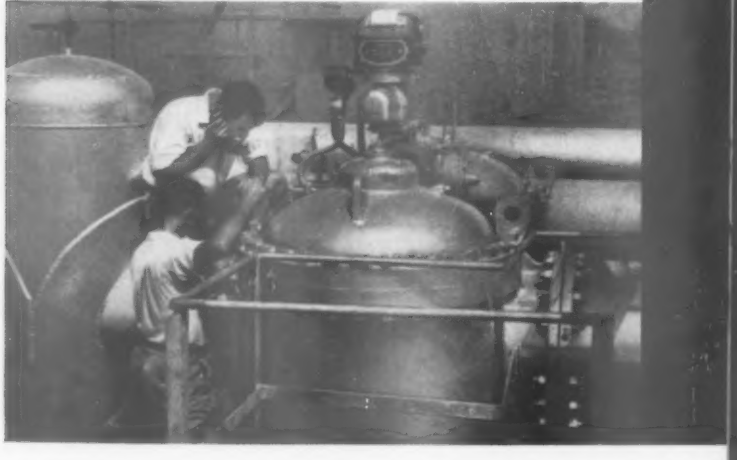
KALAMAZOO, MICHIGAN

Sales & Service: West. Dist. Branch, Oakland 6, Cal. • Southwest Dist. Office, Tulsa 3, Okla. • Automotive Products Co., Ltd., Brock House, Langham St., London W.1, England, European Rep.

Giant
A. O. Smith
W-1750
Meter

RECORDS

Measuring the wealth of an oil oasis . . . This new W-1750 meter is used to accommodate the 24-inch pipeline which transfers crude from the desert terminal to tankers at loading docks. The W-1750 will meter crude at a rate of 25,000 barrels per hour — accurately and dependably. A. O. Smith's factory representative was on hand during this installation.



25000 BARRELS PER HOUR!

Unique A. O. Smith meter installation in Middle East sets "world record" for positive displacement capacity

Even in this age of technological miracles, the precise measurement of 25,000 barrels of crude every hour *through one meter* staggers the imagination. Yet, when the problem was presented to A. O. Smith engineers, it didn't stagger theirs very long.

A. O. Smith already had a great store of experience in large capacity metering with the world's largest rotary positive displacement meter — B-875. By designing a special manifold to join two B-875's and combining the readings on one counter, the job was done.

B-875 meters have also been supplied for multiple meter installations in the Middle East to handle capacities of 125,000 barrels per hour.

The durability of the B-875 meter is as renowned as its accuracy. When one of the meters recorded 100,000,000 barrels of crude and refined products it was thoroughly examined. No replacement parts were required to return the meter to service.

The new Armorloy solid film lubricant process is also responsible for the exceptionally high metering capacity of A. O. Smith meters.

These huge A. O. Smith meters are going places . . . The highly successful performance of the world's largest rotary positive displacement meter has earned it many important assignments around the world. This A. O. Smith shipment was destined for Libya. No matter where you go, A. O. Smith meters are world-famous for their accuracy, dependability, rugged performance.

Through research ...a better way

A.O.Smith
CORPORATION

METER AND SERVICE STATION EQUIPMENT DIVISION

Factory: 1602 Wagner Ave., Erie, Pa. Offices: Atlanta 24, Ga.; Chicago 3, Ill.; Houston 2, Texas; Los Angeles 22, Calif.; New York 17, N. Y.; Newark, Calif.; Tulsa, Okla. A. O. Smith INTERNATIONAL S. A. Milwaukee 1, Wis., U. S. A.

Contactor No. 7

Gas treating tips from Allied Chemical

How to Find and Correct Trouble Spots in Your Gas Treating Unit

Locations in an ethanolamine gas treating plant most likely to cause operating difficulties from time to time, are pumps, amine stripper, heat exchangers and contactor. Often these spots are the source of trouble during plant start-up; paying particular attention to them then can save you lots of time later. But whether yours is a new unit or one in operation for some time, the following trouble-shooting hints can help you solve operating problems faster.

Prevent Cavitation of Solution Pumps

Two causes of cavitation in pumps are high quantities of carbon dioxide in the lean amine stream they normally handle, and suspended solids. To correct the former, CO_2 loading and solution pressure must be controlled.

Large amounts of suspended solids can rapidly erode pumps and usually are the result of faulty filter operation. You can minimize damage by slowing pumps down slightly from design speed, but this is only a stop-gap measure.

Proper Operation of Stripper

If the CO_2 content of the lean amine solution exceeds 5 volumes per volume of amine solution, it will damage the reboiler tubes. So careful testing of this solution is necessary—especially early in the life of a unit.

The overhead condensate of the amine regeneration still should contain a slight amount of MEA or DEA—generally 0.5% of whichever amine is used—as a corrosion preventive. Otherwise CO_2 or H_2S or both, which are normally present with water in the overhead, will chew up the equipment. But don't have too much amine in the overhead condensate, or your reflux rate won't be high enough and you will suffer high amine losses.

Keep Data on Heat Exchangers

You should record data on the performance of various heat exchangers in the plant as soon as possible after start-up. This is invaluable in determining fouling rates and other performance factors as operations progress. Such information should be referred to if corrosion of any heat exchanger is suspected or if the plant is not processing the required amount of gas.

What To Watch in the Contactor

Keep the temperature of the lean amine to the contactor about 10° higher than the inlet gas temperature. If you don't, you may condense hydrocarbons in the rich amine solution—and bad foaming will result. Where the inlet gas temperature is exceptionally high, keeping the amine solution 10° hotter may interfere with proper gas absorption. In that case, you may have to cool the inlet gas stream before charging it.

Maintain a close check on the control valve on the rich amine stream leaving the contactor—even using the manual by-pass and inspecting the inner valve assemblies. This valve gets hard service because pressure drops markedly at this point, and evolution of corrosive CO_2 and H_2S can occur. You may consider using a rich amine flashtank with interchange at an intermediate pressure to make conditions less severe for the valve.

FOR MORE INFORMATION on gas treatment, look for the next GAS TREATING TIPS.

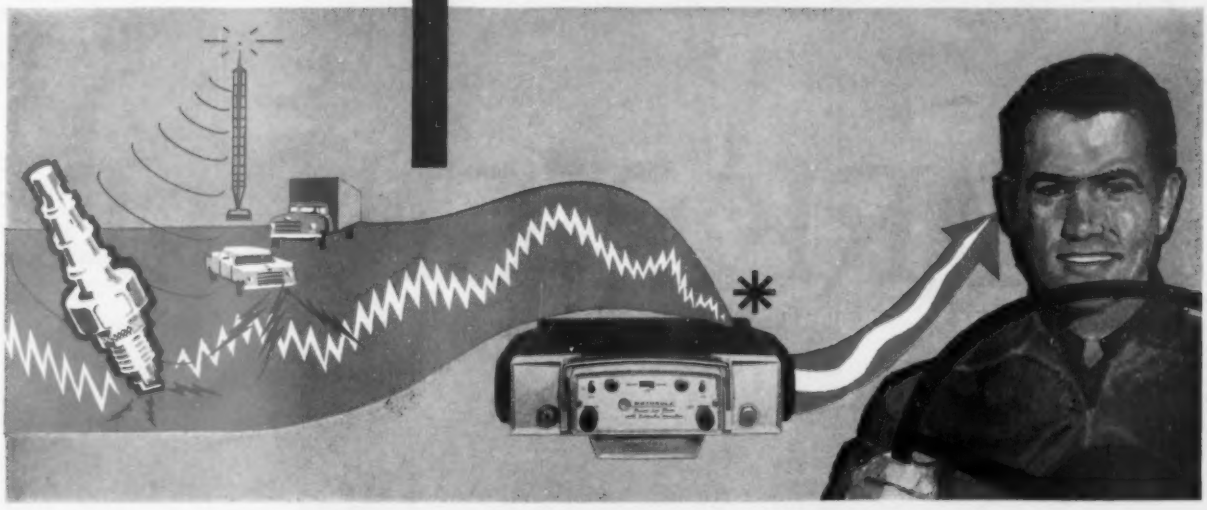
For specs on Allied Chemical Ethanolamines and Ethylene Glycol, and offices, see Chem. Materials Catalog, page 272 and Chem. Week Buyers' Guide, page 272A. 2819

Allied Chemical

NITROGEN DIVISION
Dept. C7-55-3, 40 Rector St., New York 6, N. Y.

new...Motorola MOTRAC radio with

EXTENDER *operation*



✳ *CUTS OUT IGNITION NOISES*

Dramatically Improves Overall Efficiency In 24-50 mc 2-Way Radio Systems

Motorola MOTRAC radio with Extender operation puts ignition noise suppression where it does the most good—built right into the receiver. Here it suppresses ignition noises from your own vehicle as well as those in the vicinity... providing the answer to the biggest problem in low-band 2-way radio systems today.

First and foremost, Extender operation improves reception throughout your system. In as much as ⅘'s of your territory, ignition noises can garble your messages. Now messages are clear. "Hash" caused by ignition noise is gone. *Second*, you can "extend" useable operating range where ignition noises are high. Motorola Extender operation suppresses disrupting ignition noise on weak, fringe area signals allowing the message to come through clearly—right out to the limits of your radio coverage. *Third*, you can reduce interference from other radio systems (extraneous messages, ringing and other noise interference known as intermodulation)... just flip the switch on the control head.

"MOTRAC" is a trademark of Motorola Inc.

HEAR FOR YOURSELF

Send in coupon NOW
for a free, on-the-job recording...
listen to the dramatic
difference in message clarity.

Motorola Communications & Electronics, Inc.
4501 Augusta Blvd., Chicago 51, Illinois
A Subsidiary of Motorola, Inc. Dept. AOG146

☐ Send me phonograph record
☐ Have salesman phone for appointment

Name _____ Title _____
Company _____
Address _____
City _____ Zone _____ State _____

MOTOROLA 2-WAY RADIO

THE MOST SIGNIFICANT

Stewart and Stevenson announces the ALL NEW

NATURAL GAS CONVERSION

FOR GENERAL MOTORS SERIES 71 DIESEL ENGINES

WHY DO WE SAY IT'S THE MOST SIGNIFICANT ENGINE NEWS IN A CENTURY?

BECAUSE

For years there has been a growing demand for a true spark ignited, natural gas burning engine with the flexibility and superior performance characteristic of the General Motors Two Cycle Diesel Engine.

The development by Stewart & Stevenson Services of a Spark Ignition Conversion Kit for this great Diesel Engine offers a world of new advantages to prospective engine users as well as the owners of existing General Motors Diesel applications wherever lower cost, natural gas is available.

Now, you can enjoy **"Jimmy Diesel"** performance, long life and flexibility PLUS the advantage of being able to operate (through a simple conversion) on either Diesel fuel or straight natural gas . . . **WITHOUT OWNING TWO TYPES OF ENGINES.**

General Motors Series 71 Engines equipped with the new Stewart & Stevenson Spark Ignition Conversion operate on natural gas fuel developing full rated horsepower. Furthermore, their acceleration and lugging characteristics are simply amazing.

These new engines equipped for natural gas operation as well as the conversion kits available for older series 71 engines are thoroughly **TRIED AND PROVEN.**

They are the result of thousands of hours of exhaustive research and field testing over a period of more than three years.

Write today for more information on how these new Stewart & Stevenson Services developments can benefit you.

ENGINE NEWS IN A CENTURY

12 NEW SPARK-IGNITED MODELS

FROM 50 H.P. TO 1440 H.P.

MODEL 3SG
Horsepower.....50 to 76
Number of Cylinders.....3
RPM (Continuous Duty).....
.....1200 to 1800
Weight....1600 lbs., approx.

MODEL 4SG
Horsepower.....63 to 107
Number of Cylinders.....4
RPM (Continuous Duty).....
.....1200 to 1800
Weight....1800 lbs., approx.

MODEL 6SG
Horsepower.....100 to 163
Number of Cylinders.....6
RPM (Continuous Duty).....
.....1200 to 1800
Weight....2150 lbs., approx.

MODEL TWIN 4SG
Horsepower.....125 to 212
Number of Cylinders.....8
RPM (Continuous Duty).....
.....1200 to 1800
Weight....5000 lbs., approx.

MODEL 8VSG
Horsepower.....135 to 250
Number of Cylinders.....8
RPM (Continuous Duty).....
.....1200 to 1800
Weight....2550 lbs., approx.

MODEL TWIN 6SG
Horsepower.....200 to 326
Number of Cylinders.....12
RPM (Continuous Duty).....
.....1200 to 1800
Weight....5700 lbs., approx.

MODEL 12VSG
Horsepower.....200 to 360
Number of Cylinders.....12
RPM (Continuous Duty).....
.....1200 to 1800
Weight....3300 lbs., approx.

MODEL 16VSG
Horsepower.....275 to 500
Number of Cylinders.....16
RPM (Continuous Duty).....
.....1200 to 1800
Weight....5800 lbs., approx.

MODEL QUAD 6SG
Horsepower.....400 to 650
Number of Cylinders.....24
RPM (Continuous Duty).....
.....1200 to 1800
Weight..12500 lbs., approx.

MODEL TWIN 12VSG
Horsepower.....400 to 720
Number of Cylinders.....24
RPM (Continuous Duty).....
.....1200 to 1800
Weight..13500 lbs., approx.

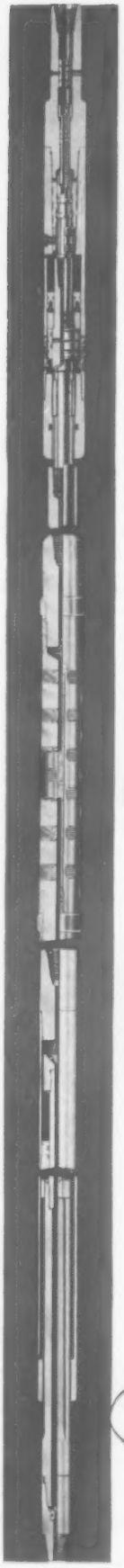
MODEL TWIN 16VSG
Horsepower....550 to 1000
Number of Cylinders.....32
RPM (Continuous Duty).....
.....1200 to 1800
Weight..17800 lbs., approx.

MODEL QUAD 12VSG
Horsepower....800 to 1440
Number of Cylinders.....48
RPM (Continuous Duty).....
.....1200 to 1800
Weight..26000 lbs., approx.

STEWART & STEVENSON SERVICES, INC.

Main Office and Plant: 4516 Harrisburg Blvd., Houston 11, Texas
Phone CApitol 5-5341
Branches: Corpus Christi, Dallas, Lubbock, San Juan, San Antonio, Beaumont, Odessa
Representatives: Longview, Brownsville, Wichita Falls, Freeport, Galveston, Waco
Export: Room 1405, 74 Trinity Place, New York, N. Y.

THE WORLD'S LARGEST DISTRIBUTOR OF DIESEL ENGINES



the Bowen hydraulic pulling tool frees stuck fish... QUICKLY

With the Bowen Hydraulic Pulling Tool, you can speed up all your tough pulling jobs. Whether you're pulling liners, packers, pipe, or any other stubborn fish, there's no strain on the fishing string or the rig . . . hydraulic pressure exerts all the pull needed to release the fish. No chance of accidentally losing the fish, either, since no rotation is necessary with the Bowen Hydraulic Pulling Tool. Only simple up-and-down motion is all that's required to operate the valve. In dry holes, the Bowen Hydraulic Pulling Tool is a big time-saver. Fluid is retained in the string during the entire pulling operation — no need to waste time after each pull waiting for the string to fill up again.

Valve Section — controls the fluid. Circulation may be directed through the tool into the fish. A relief valve vents the fluid to avoid pulling a wet string.

Anchor Section — engages the casing, holding the tool in place. Slips cannot wedge to hinder release. Safety rings prevent running into undersize casing.

Pulling Section — converts hydraulic pressure into mechanical pull, with force amplified up to 106:1 to provide a powerful breaking-out pull.

Bowen Hydraulic Pressurizer — supplies operating pressure for the Hydraulic Pulling Tool, with all pumps, power unit, fittings and tanks mounted on a trailer for easy transport.

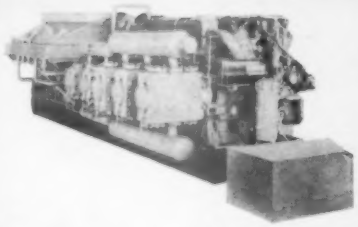
BE READY! Write today for your copy of the complete technical manual on the Bowen Hydraulic Pulling Tool.

Available from your service company domestically;
Sold through supply stores for export.

BOWEN ITCO, INC.

P. O. Box 4587
Houston 13, Texas
Cable Address: ITCO

BOWEN



Design engineered for gas booster service in the Louisiana Gulf Coast area, this packaged GMXF-10 compressor moves 4.43 MMSCFD. It is rated at 825 bhp. Equipped with Entronic Controls for remote field operation, this unit is a typical example of the efficiency gained by specifying C-B/Southern Packaged Compressor Plants.

CB/S

PACKAGED COMPRESSORS

Designed Engineering For . . .

CB/S Packaged Compressors Starts With the Customer's Problem

Sound gas compression engineering starts with understanding the basic problem. C-B/Southern sales engineers are registered petroleum engineers with actual producing experience. They assess the customer's problem, whether it is gas gathering, gas lift or gas injection, to make positive, workable suggestions. From quotation to field installation, engineering knowledge is based on practical experience. For example, last year, C-B/S built more horsepower than any other two compressor packagers combined. And because the company offers the widest range of horsepower size, C-B/S engineers have the right component to meet every specification the customer wants.

As an added benefit, C-B/Southern Packaged Compressor Plants are never orphans. Backed up by engineers in 22 Cooper-Bessemer sales and service offices, C-B/Southern service operates on a 24-hour schedule, everywhere.

C-B/S Packaged Compressor Plants are available in horsepower ratings from 100 to 1100; unitized compressors, both reciprocating and centrifugal, to 10,500 horsepower.

CB/S

C-B SOUTHERN **P. O. BOX 19267**
HOUSTON 24, TEXAS **HOmestead 8-5441**
Manufacturers of packaged compressor plants for gas gathering, gas lift, gas injection applications

A Division of The Cooper-Bessemer Corporation

It takes cannon-barrel pipe to store gas at 5,000 psi

North of the Susquehanna River near Renovo, Pennsylvania, is a depleted gas reservoir known as Leidy Field. It has just been converted into an underground gas storage field. The field has a total of 85 wells and is roughly 13 miles long and 7 miles wide.

To store gas in this natural reservoir when completed requires an injection pressure of 5,000 psi at the wellhead. This storage field provides for a peak withdrawal of 800 million cubic feet each day and an average withdrawal of 400 million cubic feet per day during the winter season.

Seamless Steel Line Pipe was selected for this

This mark tells you a product is made of modern, dependable Steel.

project, because the high pressures demanded strong, reliable pipe with almost cannon-barrel thickness. Pipe walls ranged up to 1.312" in thickness in pipe size 6⅝-inch to 12¾-inch.

USS National Seamless Steel Line Pipe met these requirements. It is ideal for lines that handle gas, liquids and solids. It's available in a complete range of wall thicknesses, steel analyses, and in diameters up to 26 inches—USS National Electric-Weld Line Pipe up to 36 inches. Write for information on our products, services and facilities. National Tube Division, United States Steel, 525 William Penn Place, Pittsburgh 30, Pennsylvania.

USS and National are registered trademarks

National Tube
Division of
United States Steel

Columbia-Geneva Steel Division, San Francisco, Pacific Coast Distributors
United States Steel Export Company, New York

1. Tin flash plate—protects bearings from oxidation and rust
2. Lead-tin overplate—conforms to shaft during break-in
3. Barrier plate—stabilizes overplate
4. Copper-alloy lining—for high load capacity
5. Steel back—gives strong bearing support

FIVE LAYERS TOUGH

When you put your equipment to work, loads on connecting rod and crankshaft bearings build up to 1,000, 2,000, 4,000 and more pounds per square inch. Engine bearings must be rugged enough to stand up under these two-ton pressures.

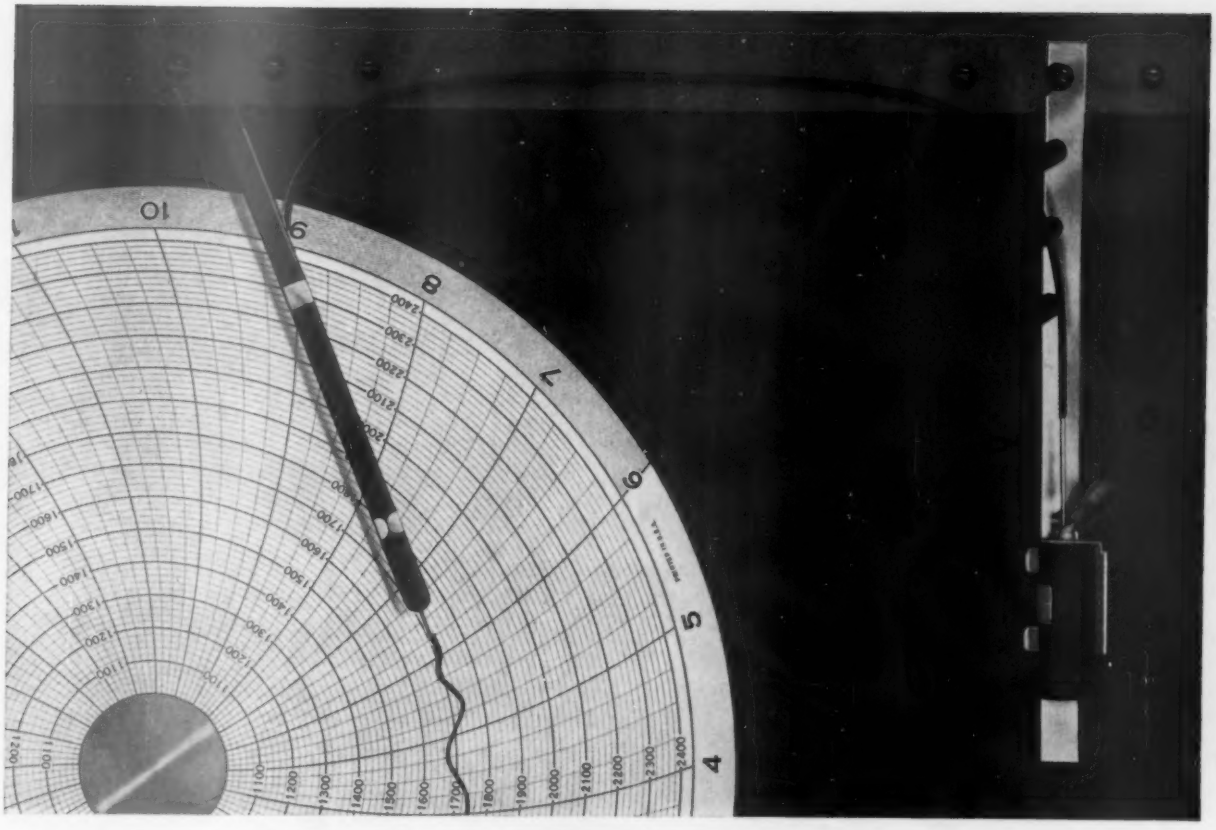
Federal-Mogul developed and built the 5-layer, heavy-duty replacement bearing for just this kind of service. It will take continuous loads up to 4,800 psi . . . triple the load limit of the best babbitts. Five separate layers give you high fatigue strength for high horsepower engines plus the good "conformability" that's necessary for new bearings to adjust to the crankshaft during break-in.

The complete Federal-Mogul line also includes overplated aluminum-alloy, straight copper-alloy and babbitt bearings. Each is designed for a particular type of engine and gives maximum service in it. When you need replacement bearings, get Federal-Mogul . . . and you'll get the best.

FEDERAL-MOGUL ENGINE BEARINGS

FEDERAL-MOGUL SERVICE

DIVISION OF FEDERAL-MOGUL-BOWER BEARINGS, INC. • DETROIT 13, MICHIGAN



Esterbrook®

NEW MARK-TROL*

eliminates 95% of the mess and maintenance of round chart recorder inking systems . . .

In 10 minutes, convert present markers with Mark-Trol, a completely sealed capillary system with replaceable ink cartridge . . . adaptable to 90% of all round chart recorders in service today.

Esterbrook's Mark-Trol is a completely new concept in marking systems. Because of its universal design, you can eliminate the messy problems inherent in most round chart inking systems in use today. Because maintenance is reduced to little more than routine inspection, Mark-Trol will pay for itself in a matter of days.

Sealed system eliminates dust, dirt, moisture and mold which clogs open-bucket devices. Operation is thoroughly efficient regardless of location, inside or out, under service conditions of humidity, precipitation, chemical fumes or other foreign matter, and over a wider temperature range —0°F to 145°F. Slip-in, disposable, sealed ink cartridge means ink is never directly handled . . . no messy suction tubes, syringes, droppers; no reservoirs to clean out. Eliminates breakage of plastic bags or glass devices. The cartridge contains a large supply of ink, extending your change cycle from days to months . . . and then in a matter of seconds the cartridge is replaced.

ORDER ONE FOR TRIAL—Mark-Trol has been field-tested for 2½ years—extensively in the power and processing fields. We invite you, however, to make a trial installation of your own with a Mark-Trol unit. Send us the coupon today.

Authorized Distributor:

Technical Recording Chart Division
Graphic Controls Corporation
189 Van Rensselaer St., Buffalo 10, New York

Please send us..... Mark-Trol Conversion Kits at $12.00 each.

Name..... Title.....

Company.....

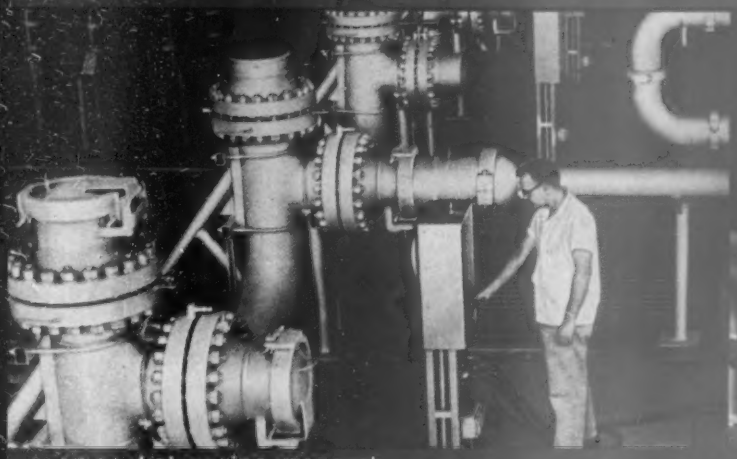
Address.....

Please also send literature completely describing Mark-Trol. ☐

*Trademark

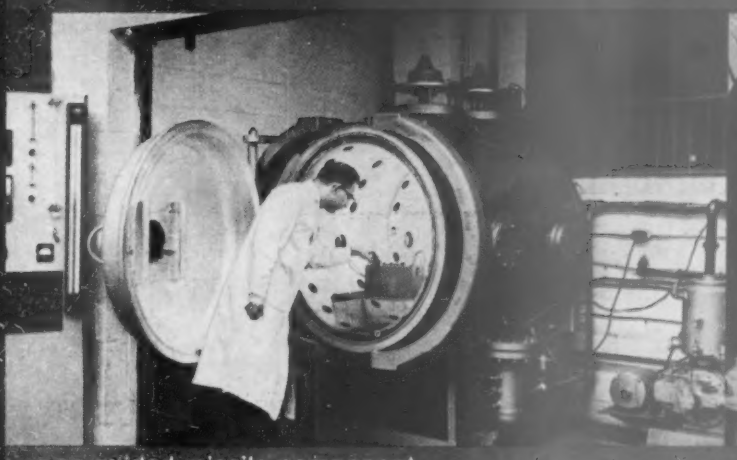
MARK-TROL **THE ESTERBROOK PEN COMPANY** • Technical Products and Instruments Division

TUBE-TURN® Hinged



on rocket engine research
and development systems . . .

on storage battery vacuum
impregnation equipment . . .



on guided missile component
environmental test chambers . . .

on pipe line "pig" launching
and recovery terminals . . .

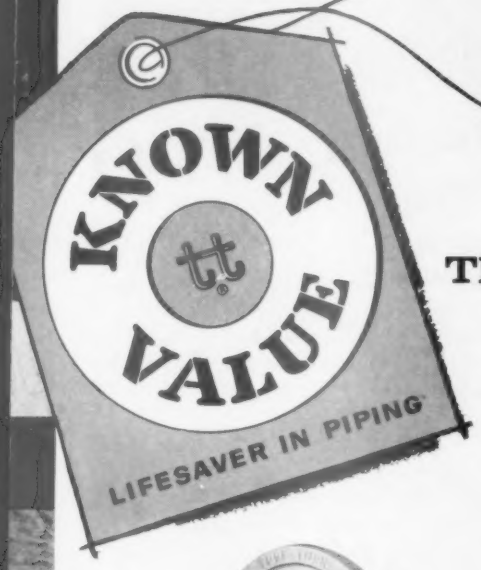
on synthetic rubber
manufacturer's blowdown tanks . . .

on paint manufacturer's
vacuum reactor vessels

TUBE-TURN Hinged Closures are stocked by and sold exclusively through Authorized Distributors.

Closures pay their way

all the way!



They save in system design
in easier installation
in faster, safer operation

If your operations require quick or frequent access to pipe ends, tank or vessel openings, TUBE-TURN Hinged Closures provide a swift, safe and economical solution. So simple to operate, one man can open and close even the largest TUBE-TURN Hinged Closure in a matter of minutes. No hammering, no tugging, no wrestling with massive caps or flanges. Just loosen the yoke bolts, swing back the head, and the opening is fully exposed and accessible.

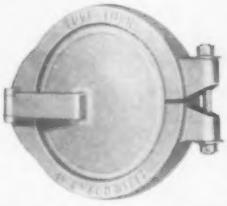
The exclusive *self-locking* tapered yoke, head, and hub design of TUBE-TURN Hinged Closures assure positive and uniform sealing while the self-bleeding safety feature of double bolt closures forewarns the operator should he try to open the closure under pressure.

TUBE-TURN Hinged Closures cut your installation costs too. Completely factory assembled, no time or effort is wasted on job-site fabrication. Only one circumferential weld is needed to join the closure to the pipe end or vessel opening.

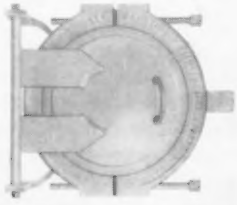
TUBE-TURN Hinged Closures are regularly furnished in forged carbon steel. However, they are also available in other metals and alloys and may be glass lined or stainless clad. They also may be furnished to meet design requirements of ASME.

For the practical, dependable, safe solution to your closure problems, specify TUBE-TURN Hinged Closures. Look for the famous "tt" trademark when you buy. It's your guarantee of quality . . . the mark of *known value*. Write for Bulletin TT1034-L-218. TUBE TURNS, Louisville 1, Kentucky.

"TUBE-TURN" and "tt" Reg. U. S. Pat. Off.



SINGLE BOLT TYPE
with Removable or Swing Bolt
in sizes 2″ thru 8″ for ASA 150-lb,
300-lb or 600-lb Service



DOUBLE BOLT TYPE
with Double-Ended Bolts
in sizes 8″ thru 42″ for ASA 150-lb,
300-lb or 600-lb Service

VERTICAL TYPE
with Attached Wrenches
and Counterbalanced Head
in sizes 8″ thru 42″ for
ASA 150-lb Service

TUBE TURNS

Division of CHEMETRON *Corporation*

4 "NEWS" for the SELECTIVE BUYER!

PACIFIC

types DS and DL

Double Volute

Double Suction

single stage centrifugal pumps

Write for Bulletin 143

PACIFIC PUMPS

Inc. . . A Division of Dresser Industries, Inc.

HUNTINGTON PARK, CALIFORNIA, U.S.A.

PACIFIC

CENTRIFUGAL PUMPS FOR PETROLEUM, CHEMICAL UTILITY & GENERAL INDUSTRIES
OIL WELL PUMPS

DRESSER INDUSTRIES INC.

OIL • GAS • CHEMICAL
ELECTRONIC • INDUSTRIAL

1 NEW QUALITY – All DS and DL pumps are skillfully moulded from meticulously fabricated patterns to provide smooth exterior and interior contours and controlled case thicknesses. All parts in contact with liquid being pumped may be fabricated from any commercially available ferrous or non-ferrous metal.

2 NEW DESIGN – Types DS and DL are *double volute* with double suction impeller. Shaft assemblies are dynamically balanced, radially and axially for minimum wear. Cases are axially split with nozzles cast integral with lower half. Type DS has provisions for water cooled packing boxes and bearings. Type DL is air cooled. Available with conventional packing or mechanical seals. Internal assemblies are mounted on only six shaft size groups for maximum parts interchangeability between pump sizes.

3 NEW PERFORMANCE – With a capacity range from 2,000 to 13,000 GPM and differential heads to 375 ft., the 22 sizes of type DS and the 13 sizes of type DL, make it unnecessary to compromise your specific pumping requirements – i. e., optimum efficiency with low NSPH.

4 NEW ECONOMY – Pacific types DS and DL pumps offer threefold economy. First, engineering skill and expert craftsmanship reduce the initial cost appreciably. Second, the balanced hydraulic design results in minimum wear on moving parts insuring higher sustained efficiency. Third, rapid disassembly plus maximum spare parts interchangeability between pump sizes assures reduced maintenance costs – less down time.

CP-26

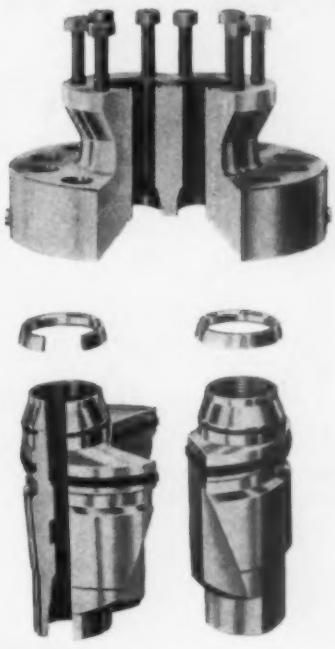
Rector "MCT" Triple Completion Tubing Head

Single, dual or triple . . . Rector's versatile MCT Tubing Head offers multiple tubing hanger arrangements that make it possible to complete a well with one, two or three tubing strings without changing the tubing head or using special attachments. All strings can be run independently without the removal of blow-out preventers. Hangers are automatically aligned in the head by fixed lugs that insure positive accurate seating without the use of guide pins. A special **RECTOR** multi-seal ring on each hanger in dual and triple completions insure positive steel seal for each tubing string. In single completion application, steel seal is obtained by use of an API ring gasket

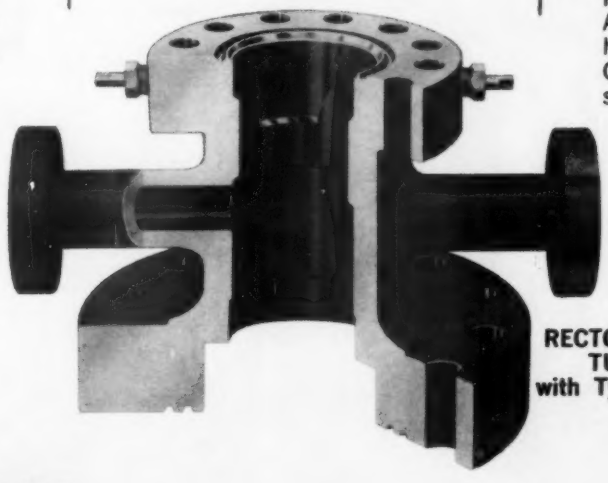
Resilient packing elements on all hangers along with removable **RECTOR-PSI** back pressure valves insure control of well during removal of blow-out preventers and installation of Christmas Tree.

For full information, contact your **RECTOR** representative or your favorite supply store.

Type "LST" Hanger and Adapter Flange
Single Hanger for use in "MCT" Tubing Head. Available with Back Pressure Valve Groove.



Type "TLCT" Hangers and Adapter Flange
Dual Hangers for use in "MCT" Tubing Head. Allows one string to be hung in tension. Grooved for Back Pressure Valve.



RECTOR TYPE "MCT" TUBING HEAD with Type "LCT" Triple Hangers

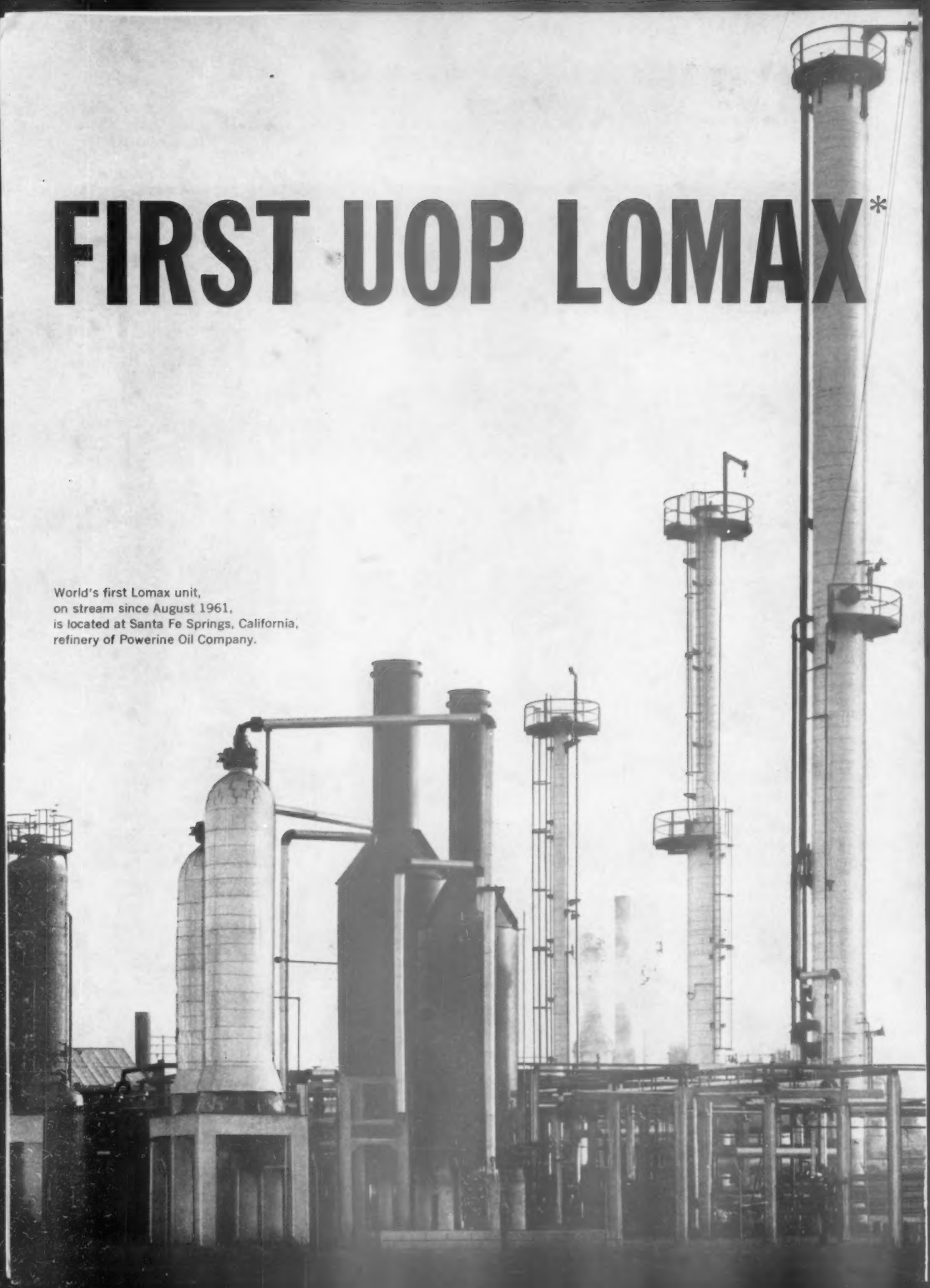
MONOGRAMMED EQUIPMENT API CERTIFICATE NO. 2116

PESA

Rector
WELL EQUIPMENT CO., INC.
Making the Oil Industry Safer!

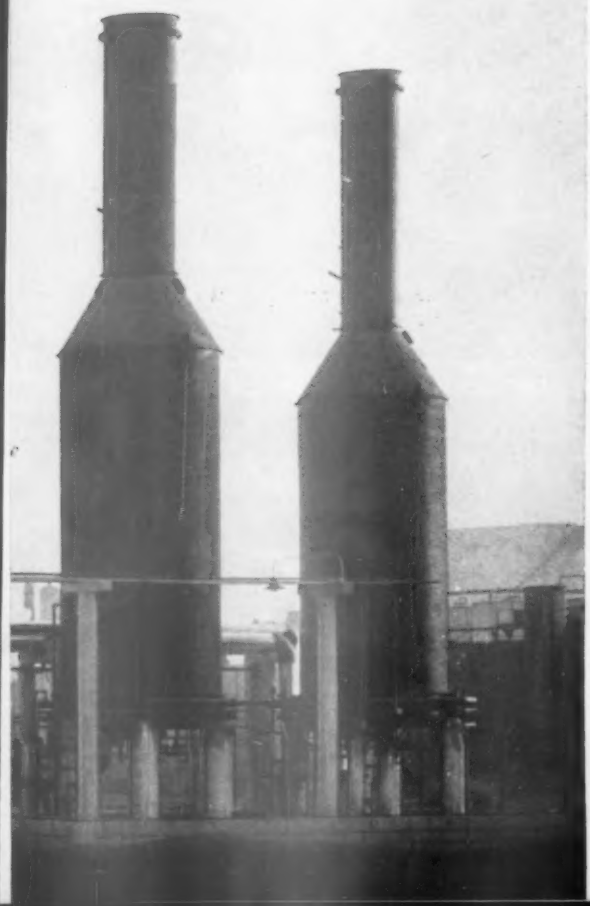
1100 North Commerce, Fort Worth, Texas • Houston Plant: 2215 Commerce Street
EXPORT REPRESENTATIVES: CONTINENTAL-EMSCO CO., MID-CONTINENT SUPPLY CO., OILWELL DIVISION OF UNITED STATES STEEL CORPORATION

FIRST UOP LOMAX*



World's first Lomax unit,
on stream since August 1961,
is located at Santa Fe Springs, California,
refinery of Powerine Oil Company.

INSTALLATIONS...



Illustrate flexibility, adaptability to market changes.

Already two installations of UOP's new Lomax process are under way. Both provide significant illustrations of the ways in which the process enables refiners to produce the end product their customers want to buy.

ON STREAM AT POWERINE . . . Now on stream at Powerine Oil Company's refinery in Santa Fe Springs, California, is the world's first Lomax unit . . . designed to produce 115 volume per cent of saturated gasoline from refinery distillate . . . 2,537 BSD of C_4-plus gasoline from a combined feed of 440-656°F. boiling range diesel fuel and 200-424°F. thermally cracked naphtha. Nominal charge capacity is 2,200 BSD. However, company officials expect to increase throughput to 3,000 BSD.

APCO UNIT NEXT . . . Under construction is the 2,950 BSD Lomax unit at the Arkansas City, Kansas, refinery of the APCO Oil Corporation. Designed to convert middle distillate oil into high octane gasoline, the new unit will produce 115 barrels of 10-lb. vapor pressure gasoline for each 100 barrels of oil charged. Charge stocks will be combined catalytic, light cycle and virgin gas oil. The unit will produce light gasoline (C_5-C_6) with a 97.5 leaded octane rating. Installed as a major step in a modernization program, the new unit will enable APCO to shutdown existing thermal cracking operations . . . and to maintain its position of supplying high quality products to jobbers and dealers.

MAXIMUM PRODUCT FLEXIBILITY . . . No matter what your geographic location, climatic conditions or other demand variables, the flexibility inherent in the Lomax process should pay significant dividends. Lomax allows the refiner to offer more of the products in demand at any given time . . . gasolines, kerosines, heating oils, jet fuels, whenever your customers are ready to buy. Lomax, essentially a cracking-with-hydrogen process, permits higher liquid yields . . . up to 120 barrels per 100 barrels of charge stock. Lomax middle distillates and gasolines have extremely high purity.

UOP's engineers will appreciate an opportunity to show you how Lomax can provide economic advantages in your specific refining and marketing situation.

*Trademark

UOP®

UNIVERSAL OIL PRODUCTS COMPANY
30 Algonquin Road, Des Plaines, Illinois, U.S.A.
WHERE RESEARCH IS PLANNED WITH PROGRESS IN MIND

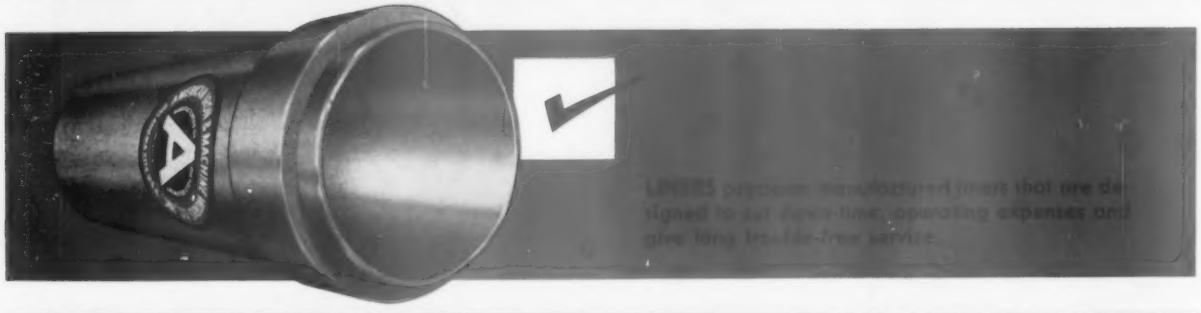
☑ Check the Complete Line of Quality

AMERICAN IRON SLUSH PUMP SPECIALTIES

for greater pump efficiency!

VALVES and SEATS now available with two highly developed valve inserts. Compound 808 ... a synthetic rubber base which is highly resistant to oil, heat, and acids. NEW Compound 102 Urethane insert — has a phenomenal record of long, trouble-free runs, makes it the best insert on the market today.

PISTONS engineered for longer life, better performance and available in three types of piston rubber for oil field conditions. Fully heat treated one-piece piston body minimizes the possibility of galling or scoring liner.



LINERS precision manufactured liners that are designed to cut down-time, operating expenses and give long trouble-free service.

RODS manufactured with the latest electronic equipment. American Iron rods reduce washout, rod breakage and thread galling.

ALSO AVAILABLE . . . A complete line of liner and rod packings.
YOU BUY QUALITY IN SLUSH PUMP SPECIALTIES . . .
WHEN YOU SPECIFY AMERICAN IRON.

AMERICAN IRON & MACHINE WORKS CO., INC. — MANUFACTURERS OF OIL FIELD EQUIPMENT — OKLAHOMA CITY

Another AMF Product — PETROLEUM EQUIPMENT

AMERICAN IRON & MACHINE WORKS COMPANY, INC.
518 North Indiana Avenue • Oklahoma City, Oklahoma
Subsidiary of AMERICAN MACHINE & FOUNDRY COMPANY

ROCK ISLAND

GLASS REINFORCED EPOXY PIPE AND TUBING

BEST

BECAUSE IT'S

PRE-STRESSED

This significant development (similar to pre-stressing concrete) places the load on the *glass* — rather than the epoxy resin — through pre-stressing thousands of strands of alternate plies of lateral and longitudinal glass roving. Consequently, Rock Island's new glass/reinforced epoxy pipe and tubing is rugged and practical for use in oil fields.

Pre-stressing develops maximum collapse and tensile strength, making the tubing ideal for high-pressure injection wells. Rock Island 2½" high-pressure tubing is built to withstand pressures up to 1,500 p. s. i. Upset ends are fabricated into the tubing during manufacture for maximum strength. Regular chain tongs may be used in making up joints . . . tubing can be handled in doubles . . . and tubing strings can be suspended on slips. Joints are threaded and coupled with standard AST 60° stub threads.

Thousands of feet of this new tubing (in 20-foot lengths of 2½", 3", and 4" I.D.) are proving highly effective under conditions that call for severe corrosion and paraffin control; and under conditions requiring high pulsating pressure. It is proving equally effective in chemical industry uses for handling corrosive fluid and waste water disposal.

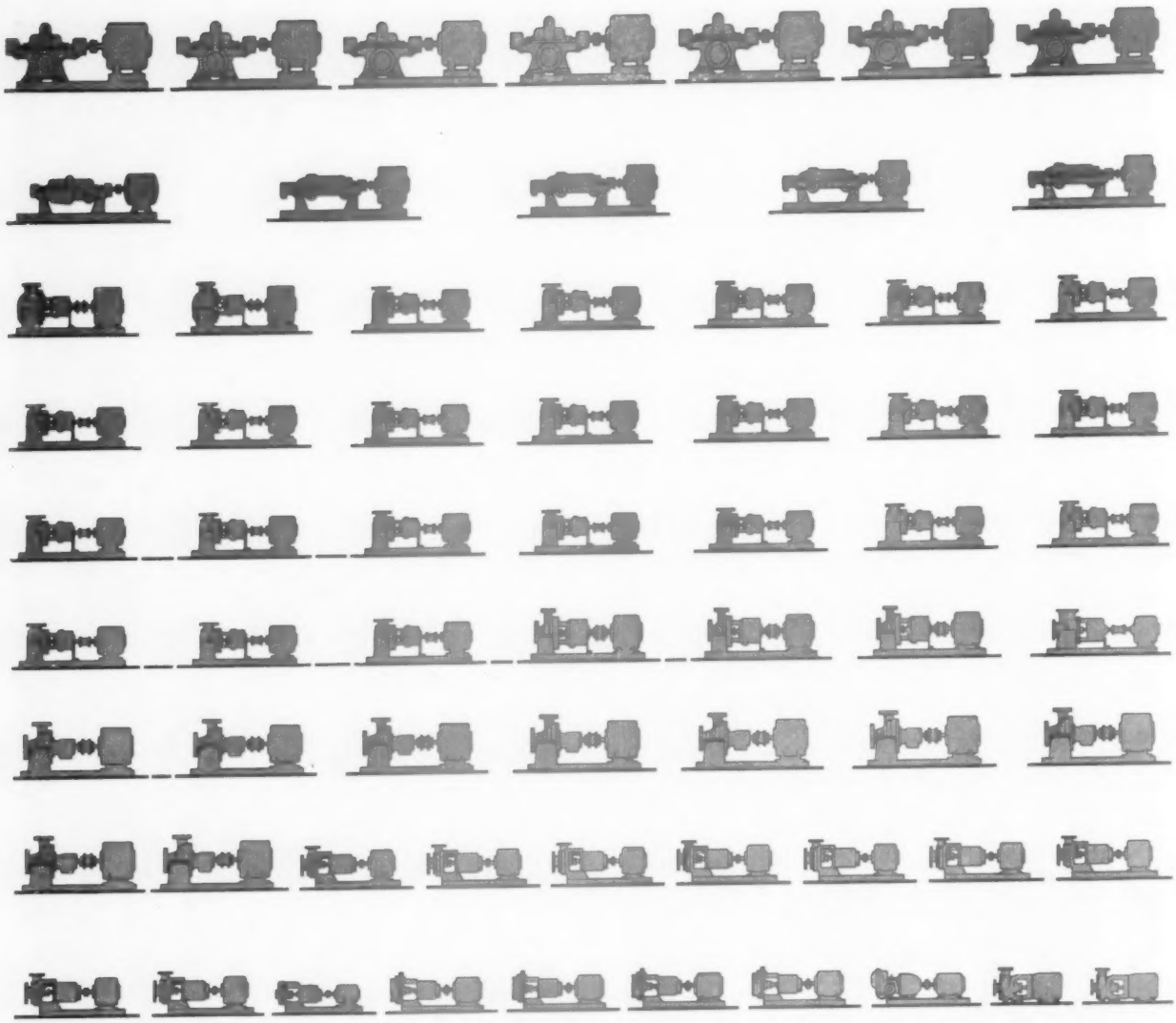
Rock Island glass/reinforced epoxy line pipe is performing in mid-continent oil fields to a high degree of satisfaction in salt water disposal and water flood systems as low-pressure pipe

COMPARATIVE SPECIFICATIONS		
2½" Medium Weight Tubing		
	ROCK ISLAND GLASS-EPOXY	OTHER
Wall Thickness	.15	.15
Operating Pressure	520 p.s.i./120°	275 p.s.i./120°
Operating Collapse	330 p.s.i./120°	80 p.s.i./120°
Operating Axial Tensile	6,060 p.s.i./120°	2,000 p.s.i./120°
2½" High Pressure Tubing		
Wall Thickness	.22	.26
Operating Pressure	1,500 p.s.i./120°	650 p.s.i./120°
Operating Collapse	750 p.s.i./120°	500 p.s.i./120°
Operating Axial Tensile	10,000 p.s.i./120°	5,000 p.s.i./120°

in 2", 2½", 3", and 4" I.D. sizes. Dresser-type couplings may be used. Adaptors are available for 8 round E.U.E. and normal pipe thread.

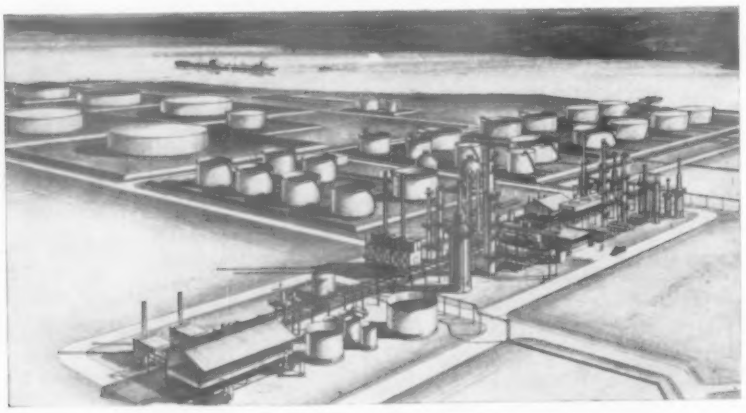
At the present time, Rock Island pipe and tubing is available in 2", 2½", 3", and 4" sizes. On special order, 6", 8", and 10" line pipe (20-foot lengths) will be fabricated to user's specifications. Future production calls for larger sizes to 30" in diameter. Contact us for detailed specifications: Rock Island Oil & Refining Co., Inc., 321 West Douglas Ave., Wichita, Kansas. Phone: WHitehall 3-8981.

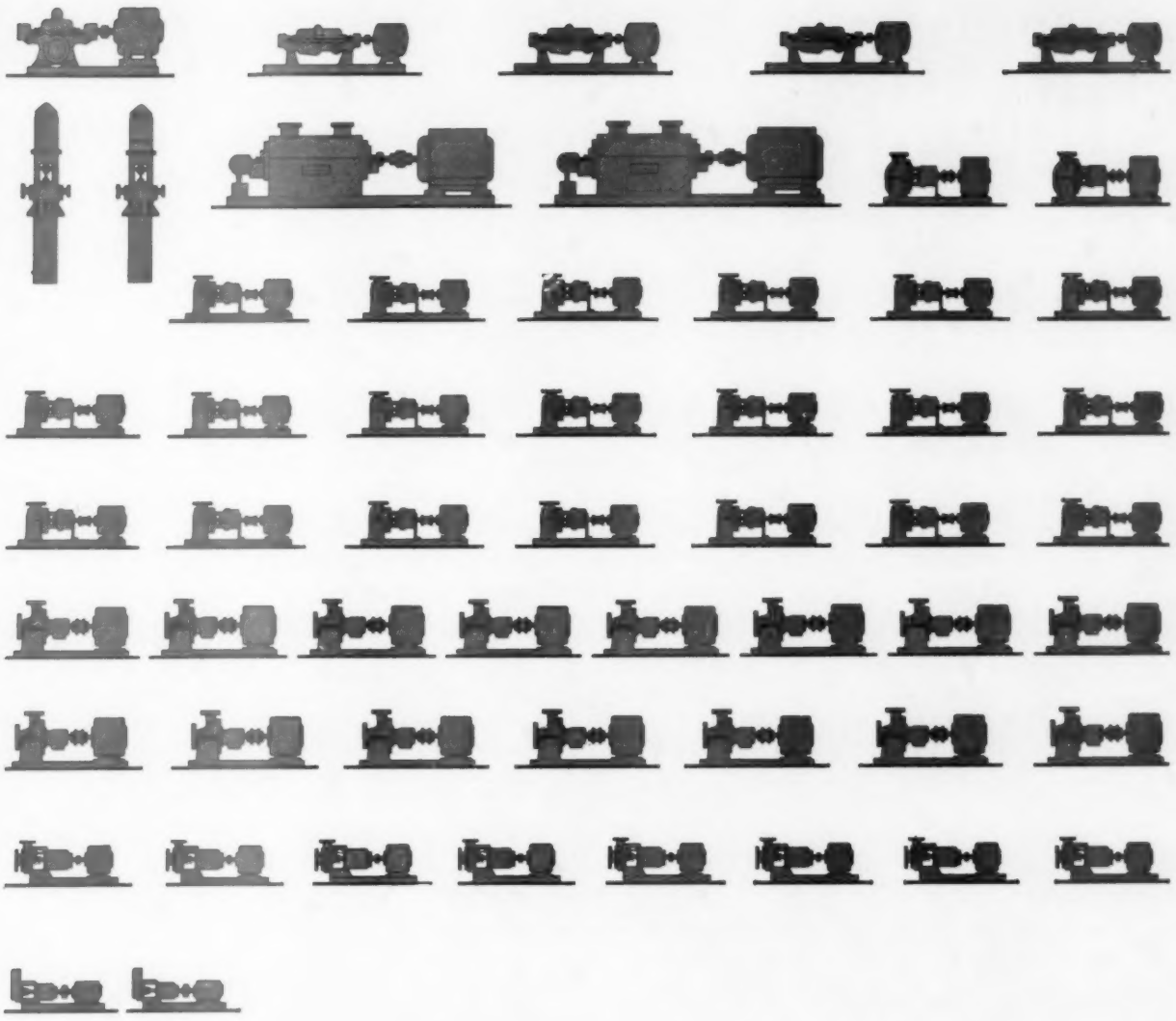
ROCK ISLAND



These 122 Ingersoll-Rand centrifugal pumps

at new "grass-roots" refinery





will handle a variety of requirements

in Panama

To handle 50,000 barrels of crude per day, and convert it to high octane gasoline takes a lot of pump power. In fact, at Refineria Panama, S.A., the all-new "grass-roots" refinery being designed and built by Bechtel organization for Continental Oil Company and National Bulk Carriers, Inc., it will take 122 centrifugal pumps of 51 different types and sizes—*all* supplied by Ingersoll-Rand.

This refinery will also have four I-R reciprocating compressors for process and instrument air service and a 7-stage I-R centrifugal compressor for recycle gas compression.

Call in your Ingersoll-Rand engineer. He has the world's largest pump line and the most comprehensive compressor experience at his disposal.

Ingersoll-Rand

305A10 11 Broadway, New York 4, N.Y.

MORE THAN A CENTURY OF PUMP PROGRESS

Performance-proved on the finest equipment...

DIAMOND

Roller Chain

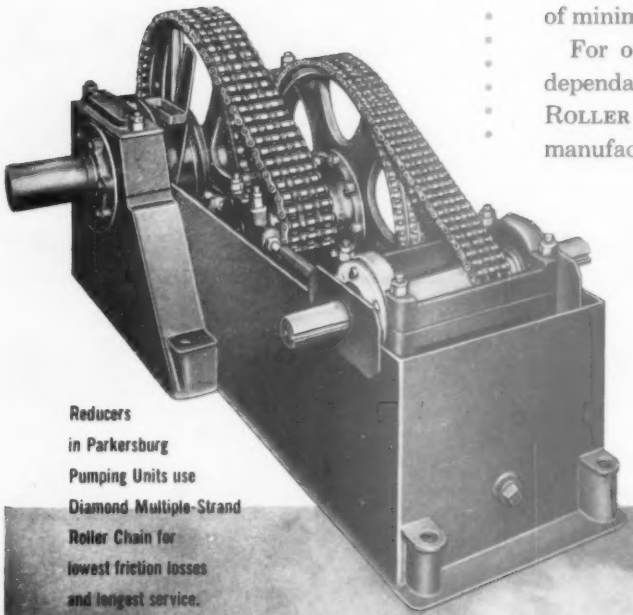
PARKERSBURG specifies DIAMOND ROLLER CHAIN for dependable operation at lowest cost!

Years of field-proven economy show why Parkersburg specifies DIAMOND Roller Chain exclusively for pumping units. Engineers credit DIAMOND standards of design and manufacturing for reliability that reduces costly down-time maintenance... and provides a bonus of minimum friction losses for lowest operating cost.

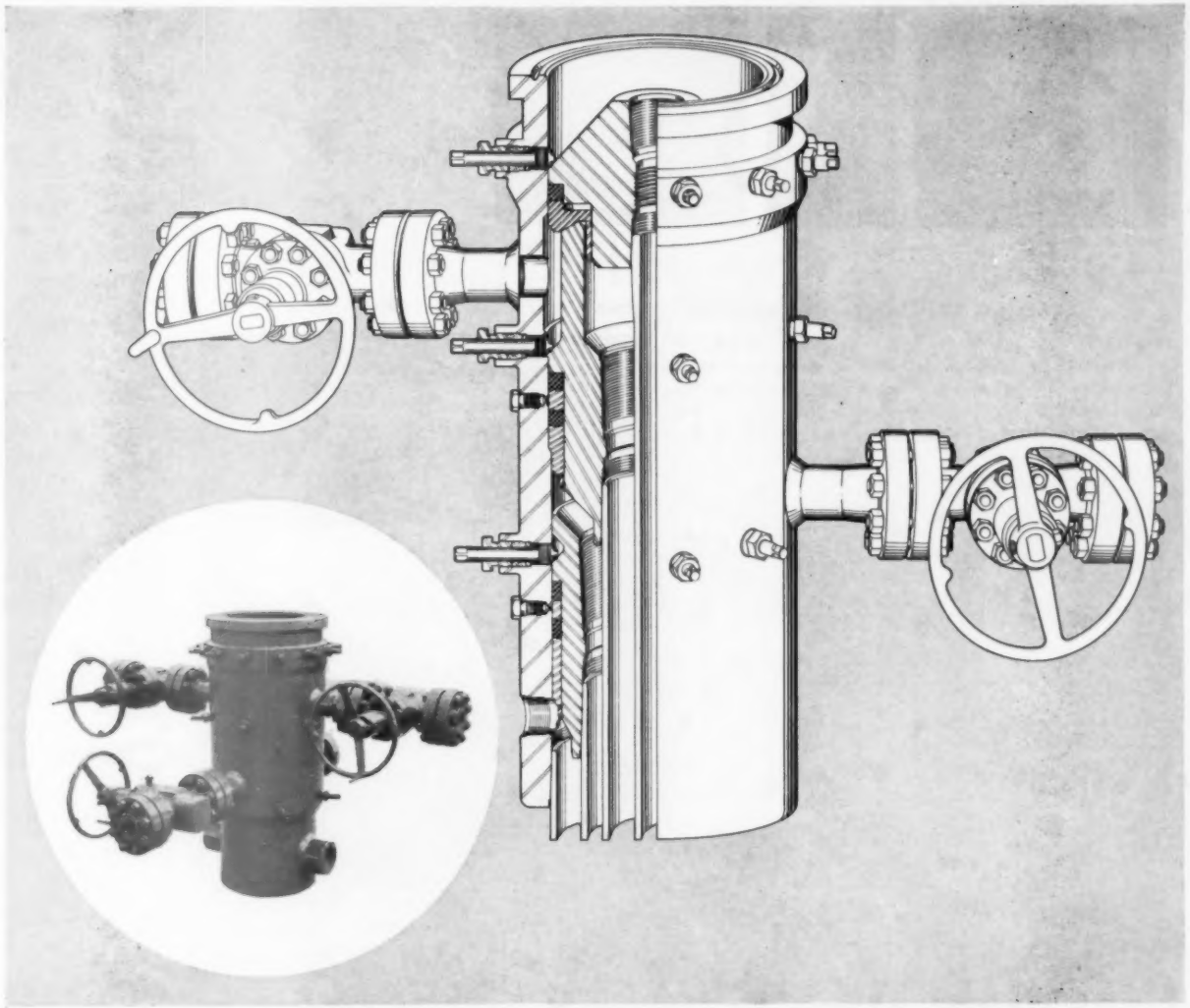
For outstanding performance in the field, where dependability means money, always specify DIAMOND ROLLER CHAIN . . . field-proven by the world's leading manufacturers of oil field equipment. Complete stocks are available at YOUR oilfield supply store. See the telephone yellow pages under CHAINS or CHAINS, ROLLER.

DIAMOND CHAIN COMPANY, INC.
A Subsidiary of American Steel Foundries
Dept. 475 • 402 Kentucky Avenue • Indianapolis 7, Indiana

OFFICES AND DISTRIBUTORS IN ALL PRINCIPAL CITIES
TULSA OFFICE: 2238 Terwilleger Blvd.; Phone RI 2-1960
DALLAS OFFICE: 9119 Diplomacy Row, Brook Hollow; Phone ME 1-2370



Reducers in Parkersburg Pumping Units use Diamond Multiple-Strand Roller Chain for lowest friction losses and longest service.



THE COMPACT HEAD

...A Time Saver

Time savings up to 48 hours in drilling and completing a deep well are possible with Cameron's Compact Head. Multiply that by your own rig cost per hour, including overhead, to obtain your possible savings.

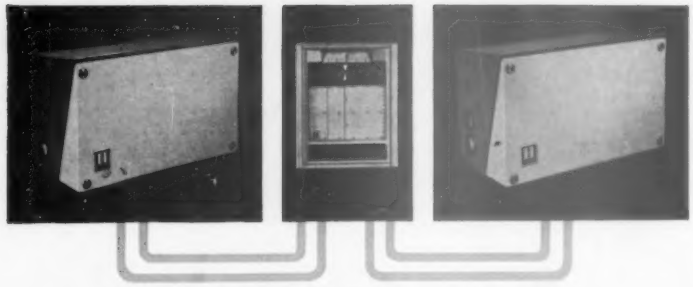
The Compact Head is used in place of two or more casing heads and the tubing head of a conventional hook-up. For instance, when the program includes 13⅜", 9⅝" and 5½" casing with 2" tubing, the Compact Head is attached to 13⅜" casing and the 9⅝", 5½" and 2" are successively landed in the Head. The 12" Blowout Preventers remain attached to the Compact Head until you are ready to set the Christmas tree on the well.

You save the time normally spent installing and removing several sizes of preventers and installing additional heads. Reduction in the number of flanged joints made up at the well reduces the hazard of leaks. Eliminating several sets of studs and ring gaskets reduces the hazard of corrosion. Total height of well head equipment will be less. With all these advantages the Compact Head usually will not cost more than the equipment it replaces.

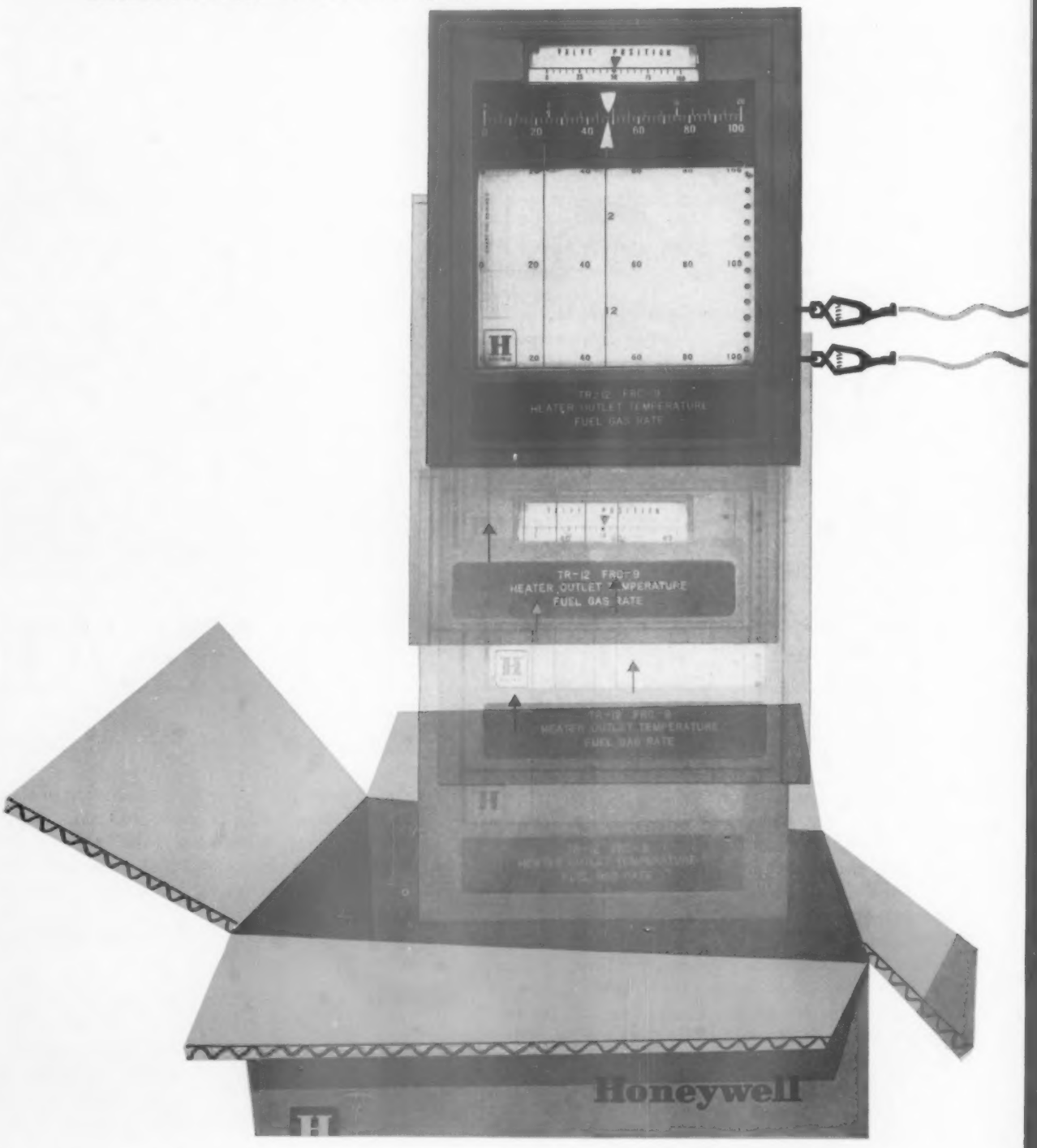
Ask the Cameron representative for more information about the Compact Head.

Cameron

CAMERON IRON WORKS, INC.
P. O. BOX 1212 • HOUSTON, TEXAS



***ElectriK Tel-O-Set*—the true 2-wire system**



This "Loop Snooper" adds to the extraordinary ease of installation and maintenance you'll find in the *ElectriK Tel-O-Set* System. It's a portable test instrument that can accurately check . . . from the control panel . . . any *Tel-O-Set* unit in the field, to make sure signals are being received and sent exactly as they should be. Or it can operate and check a recorder chassis, indicator chassis or controller on the bench, with local power. The "Loop Snooper" removes trial and error from installation and maintenance.

SIMPLEST TO INSTALL, ADJUST AND MAINTAIN

The *ElectriK Tel-O-Set* System has many features that save time in getting on stream, and keep maintenance to a minimum. For example, all process connections are isolated from the inside of *Tel-O-Set* transmitter and transducer cases, so that you can mount, pipe and wire the instruments without removing their covers. Instrument chassis can be removed for servicing without breaking any external process or electrical connections. Standardized parts and extensive use of quick-connect and plug-in design cut downtime and spare parts requirements.

No external power is required at any field-mounted *Tel-O-Set* instrument; line power is connected only at the receiver. Two-wire d-c transmission eliminates shielding and further reduces installation costs. The 4-20 milliamp signal range gives a *live* zero through the use of readily available reliable transistors.

Your nearby Honeywell field engineer can tell you how *ElectriK Tel-O-Set* advantages relate to your particular control requirements. Call him today . . . he's as near as your phone. Or write to MINNEAPOLIS-HONEYWELL, 21 Penn Street, Fall River, Massachusetts.

Honeywell

First in Control

SINCE 1885

HONEYWELL INTERNATIONAL Sales and Service offices in all principal cities of the world. Manufacturing in United States, United Kingdom, Canada, Netherlands, Germany, France, Japan.

SPECIAL REPORT TO MANAGEMENT

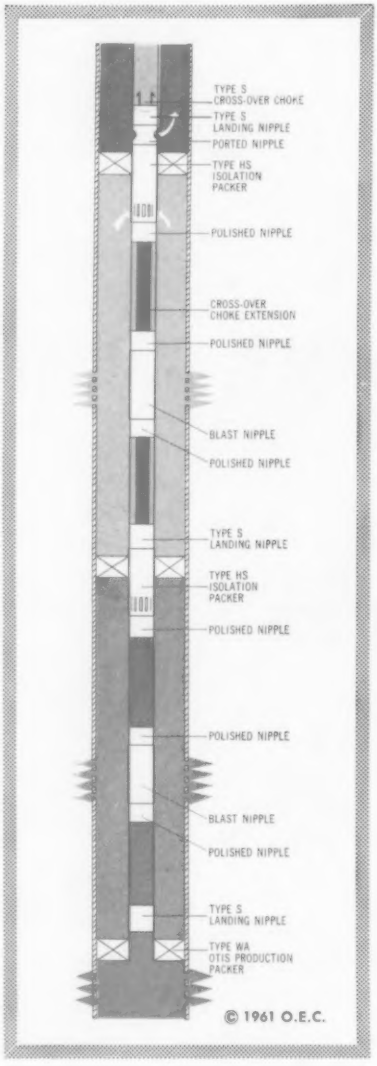
OTIS PRODUCTION NEWS

Volume II, Number 4 **Otis Engineering Corporation • Dallas** *Production Equipment and Services*

Otis Triple Zone Selective Cross-Over Completion Designed to Permit Production of Any Two Zones—Postpone Remedial Work

CORPUS CHRISTI—Operators in this area have found a new Otis Selective Cross-Over Completion ideal for producing new triple zone wells. The completion offers its greatest savings through selectivity of production, and is designed to postpone remedial operations which would entail moving a rig back over the hole. The completion is also designed to be made in standard 5½" casing using 2⅜" tubing to aid in holding downhole equipment costs to a minimum. This new Otis triple zone completion is designed to permit any one of the three zones to be produced individually with the other two blanked off, or two of the three zones to be produced simultaneously, directing the production from either zone through the annulus or the tubing as desired. When producing two of the zones simultaneously, one of the zones must be crossed-over just above the top packer through the use of a standard Otis Concentric Cross-Over Choke.

In addition to the above, this type of cross-over completion offers several other production advantages. The completion technique employed on initial installation is designed to permit each packer to be tested to the breakdown pressure of the zones before the next packer is set. Access to the upper zones is through the ports in the Sliding Side-Door® assembly of the Type HS Otis Retrievable Isolation Packer. Type HS Packers are used to isolate the upper two zones as shown in the accompanying installation diagram. In this installation, by straddling the upper zone with the top two packers, a short extension to the Otis Straight Flow or Cross-Over Choke acts to permit selective production of the middle and lower zones or the middle and upper zones through the tubing or annulus, with the alternate zone blanked off in each case. This also serves to permit chokes to be changed by standard wire line methods without requiring a rig over the hole.



In addition to these advantages, the completion technique is designed to permit any one of the zones to be exposed to the tubing or the casing, or both, with the other two zones blanked off for circulating, treating, and testing. Fracturing treatments on individual zones at pressures up to 4,500 p.s.i. have been performed in wells using this type of completion.

This is another Otis-engineered completion designed to provide the ultimate in economical, versatile, and efficient alternate-zone selective production. For more information on alternate-zone, selective and multiple completions, or for help with any other specific completion problem, call the Otis office nearest you or write Otis, Dept. 4-W, P.O. Box 35206, Dallas 35, Texas. You'll find your Otis Well Completion Specialists ready to help you . . . anxious to serve you.

OTIS

Engineering Corporation

General Offices:

6612 Denton Drive • Dallas, Texas

now...UOP offers 18 ADDITIVES for petroleum product quality control

From Down-hole to engine combustion there is a UOP additive or combination of additives for the efficient protection of your petroleum products.

Product	*Application*
OXIDATION INHIBITORS	
UOP No. 4*	Prevents gum formation and lead deposition in unstable gasolines.
UOP No. 5*	Prevents gum formation and stabilizes TEL . . . catalyzes air oxidation of mercaptans.
UOP No. 5-S*	Similar to No. 5, but catalyzes sweetening at a sharply increased rate.
UOP No. 7*	For relatively stable gasolines; stabilizes TEL, is insoluble in acid or alkaline tank bottoms.
UOP No. S-7*	33⅓% solution of No. 7 for liquid injection into gasoline.
UOP 88*	Minimizes gum formation in stored gasolines, stabilizes TEL, catalyzes air oxidation of mercaptans.
UOP 88-S*	Effective antioxidant, similar to 88, but with increased sweetening ability.
LUBRICANT ANTIOXIDANTS	
UOP 210* and UOP 225*	Ashless high-temperature antioxidants effective as stabilization agents against oxidative deterioration in lube oils and greases. Also provide corrosion protection for a broad range of metals.
CORROSION INHIBITORS	
UNICOR*	Oil soluble, film-forming corrosion inhibitor for producing, petroleum refining, and transportation equipment.
UNICOR* LHS	Light hydrocarbon-soluble corrosion inhibitor for gasolines of above-average volatility . . . excellent anti-icing agent.
COPPER DEACTIVATORS	
Regular Grade	50% active ingredients, prevents copper contamination from catalytically accelerating gum formation in high-grade gasolines.
AW* (50)	50% active ingredient, recommended for use where temperatures drop below freezing.
FUEL OIL ADDITIVES	
DRIACID*	Established sludge dispersant, excellent rust preventative in storage tanks.
POLYFLO* 100 POLYFLO* 120 POLYFLO* 121 POLYFLO* 130	Fuel oil dispersants that inhibit degradation of color and formation of sediment in distillate oils . . . peptize sediment in processing equipment.

*TRADEMARKS

UOP PRODUCT SPECIALISTS

Universal maintains a staff of product specialists located in strategic areas of the world. These specialists are available to analyze your product quality problems and recommend the most effective and economical solution. Call or write our Products Department.

UNIVERSAL OIL PRODUCTS COMPANY
30 Algonquin Road, Des Plaines, Illinois, U.S.A.
WHERE RESEARCH IS PLANNED WITH PROGRESS IN MIND

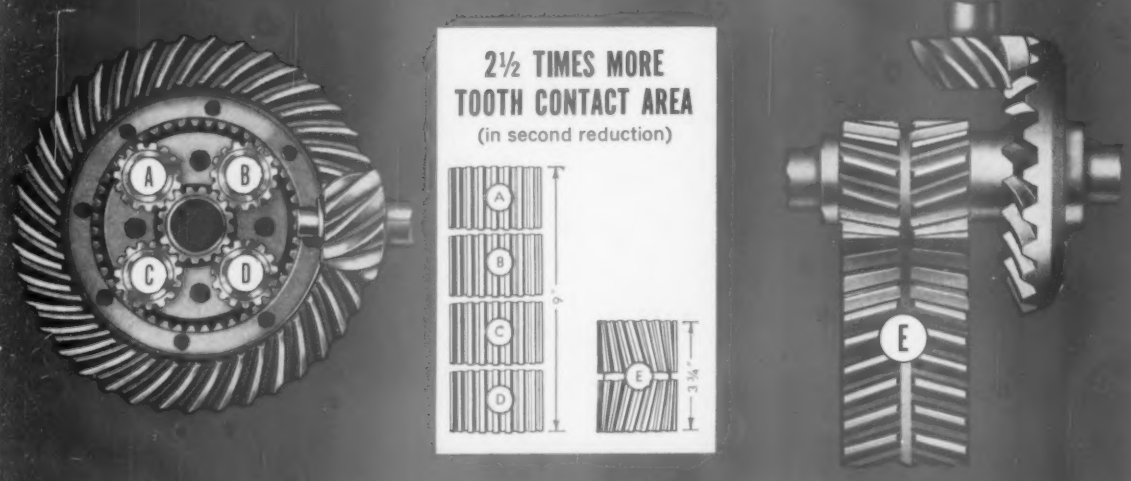
COMPARE!

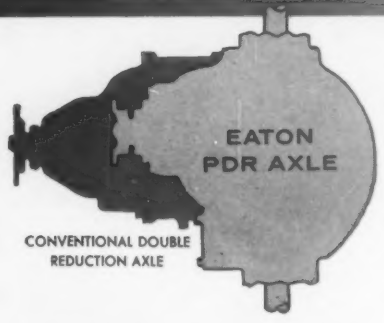
THIS

NEW EATON PLANETARY DOUBLE REDUCTION

WITH THIS

OLD EATON HERRINGBONE DOUBLE REDUCTION





Compact, space-saving design of Eaton PDR means shorter wheelbase—more payload—easy, quick maintenance.

The success of Eaton Planetary Double Reduction Axles in all types of service has proved their superiority over any other double reduction axle—including Eaton's discontinued Herringbone types. Here's basically why—

Eaton PDR is more rugged. Four planetary gears instead of one herringbone have more total gear tooth contact area to absorb load, transmit power—and give longer axle life.

Eaton PDR is shorter. Planetary gearing instead of herringbone for the second reduction reduces overall length as much as ten inches This means better driveline angles—shorter wheelbase—less weight.

There are many more reasons why Eaton Planetary Double Reduction Axles are best: lower initial cost, readily available parts interchangeability, less expensive service parts when service is required.

Compare! Then specify PDR for heavy service on your next truck order.

EATON

EATON AXLE DIVISION MANUFACTURING COMPANY
CLEVELAND 10, OHIO

...Your partner in progress through research...

EVERY FIFTH SPANG EMPLOYEE IS A QUALITY CONTROL INSPECTOR

There is no compromise on quality in the production of SPANG tubular products. To make sure that every length of SPANG pipe is as close to perfection as man can make it, every fifth man is an inspector. These perfectionists have at their disposal advanced inspection equipment, such as Magnaglow "black light," 15,000 psi hydrostatic testing and ultrasonic inspection units. This special emphasis on SPANG quality pays off in tubular product performance when the chips are down. Next time you buy pipe, be sure to talk it over with National Supply people who *specialize* in high quality oil field tubular goods. You'll be glad you did.

See next page for information on Spang Hardfacing

Both Spangweld and Spang Double Seal Shrink Thread drill pipe are available in a full range of sizes, including diameters for slim hole operations.

NATIONAL SUPPLY IS THE ONLY COMPANY THAT MANUFACTURES BOTH DRILL PIPE AND TOOL JOINTS

A SPANG drilling string is the industry's only fully integrated string. From this *single* responsible source, you get both drill pipe and tool joints that are quality controlled from start to finish. You get a drilling string specifically engineered by National Supply to minimize leakage, fatigue and corrosion.

Spangweld drill pipe and tool joints provide fast, dependable operation. The tool joints are welded to the pipe by an automatically controlled operation that insures accurate alignment. The Spangweld process elimi-

nates two threaded connections, reducing initial cost of the drill string to the user. Each weld zone is checked by Reflectoscope to determine quality of the weld. This Spangweld tool joint connection also allows a small O.D. and maximum bore, a definite advantage for slim hole drilling.

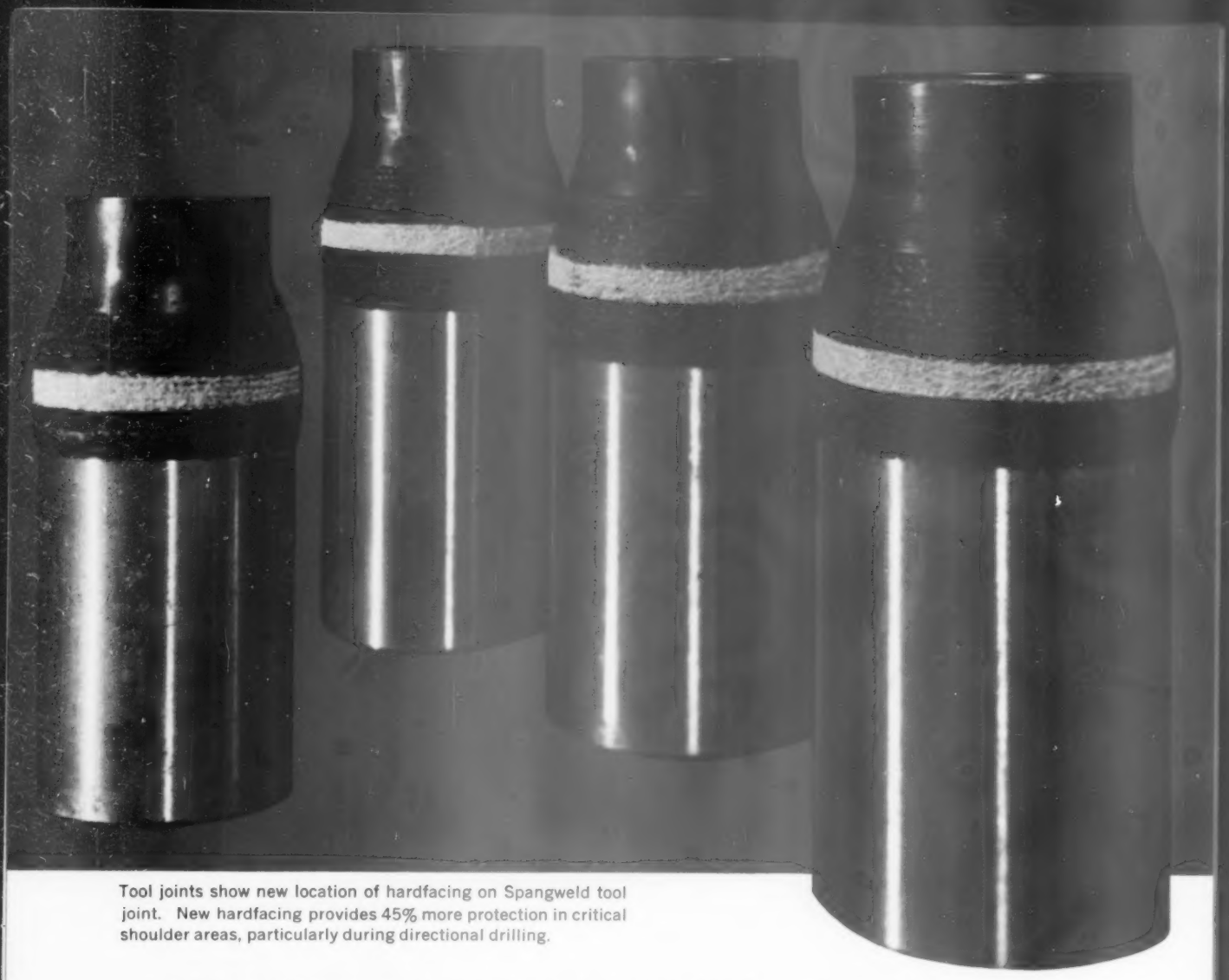
Double Seal Shrink Thread tool joints are another field-proven drill pipe product. This joint is designed with two distinct seal areas, one internal and one external. The threads have no sealing function to perform. The two sealing surfaces and the shrink thread design result in a joint that is leakproof and minimizes possibility of washout. The tool joints can be removed and replaced easily in the field.

Both of these drill pipe products are available with SPANG Hardfacing, a superior protection for tool joints in abrasive formations. A new development in SPANG Hardfacing is described on the following page.

As well depths go lower and drilling costs rise, you'll find the many advantages of SPANG drilling strings give you a good start toward lower operating costs. SPANG drill pipe is readily available in every type and diameter now in use. Get complete information from your National representative, or write to National Supply Division, Armco Steel Corporation, Two Gateway Center, Pittsburgh 22, Pennsylvania.

Steel

Steel's Symbol of strength, long life, and economy



Tool joints show new location of hardfacing on Spangweld tool joint. New hardfacing provides 45% more protection in critical shoulder areas, particularly during directional drilling.

RELOCATION OF HARDFACING INCREASES PROTECTION FOR SPANGWELD TOOL JOINTS

SPANG has now increased hardfacing protection of tool joints with 18° elevator shoulders by relocating the three-inch band of hardfacing. It now extends ⅜-inch farther along the shoulder of the joint.

The new location provides greater protection against undercutting in the critical shoulder area. It provides approximately 45 per cent more hardfacing in this critical area, even though pads have been eliminated.

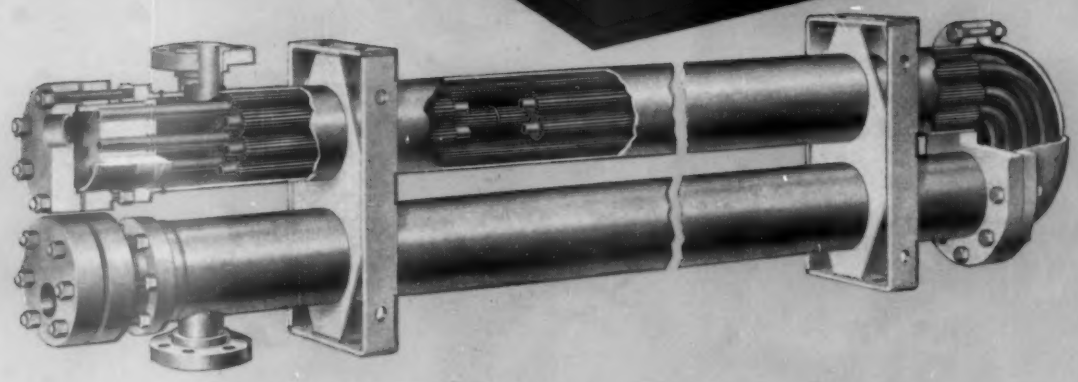
Field studies have shown that this new location for hardfacing eliminates the need for pads, however they can still be supplied at the customer's request.

SPANG engineers and production experts have pioneered many of the important advances in hardfacing of tool joints. The SPANG process consists of continuously overlapping multiple bands of tungsten carbide on the joint to form a solid particle-to-metal band. The method of application employed by SPANG is the tungsten inert gas welding process.

Get complete information on this new, improved hardfacing from your National Supply representative. Or write to National Supply Division, Armco Steel Corporation, Pittsburgh 22, Pennsylvania.

ARMCO National Supply Division

NEW

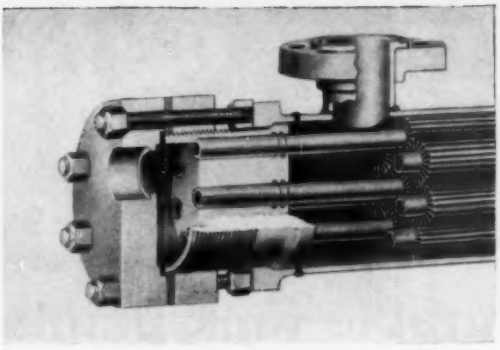


TYPE "V"

G-R *Multi-Tube*

TWIN G-FIN SECTIONS

● G-R Type "V" Twin G-fin Sections, with multiple G-fin tubes mounted in a single shell, assure high flow capacity and permit just one multi-fintube section to do the work of four or more Type "C" or Type "L" Twin G-fin Sections, saving space, manifolding and piping. The tube bundle can be removed easily as a unit, inspected, cleaned and put back in the shell, or replaced with another bundle, without breaking the shellside connections. Use of G-R patented, service-proved G-fins permits selection of tube material to suit tubeside fluids and fin material to suit shellside fluids. Tubeside pressures to 1000 psig; shellside pressures to 410 psig; temperatures to 650°F. Wide range of sizes and capacites to meet practically any duty.



Cut-away View of Head End of a G-R Type "V" Twin G-fin Section Showing the Shell Side Seal.

Get full details. Write for a copy of Bulletin No. 1402 today!

The Griscom-Russell Co.

MASSILLON, OHIO

Affiliated with

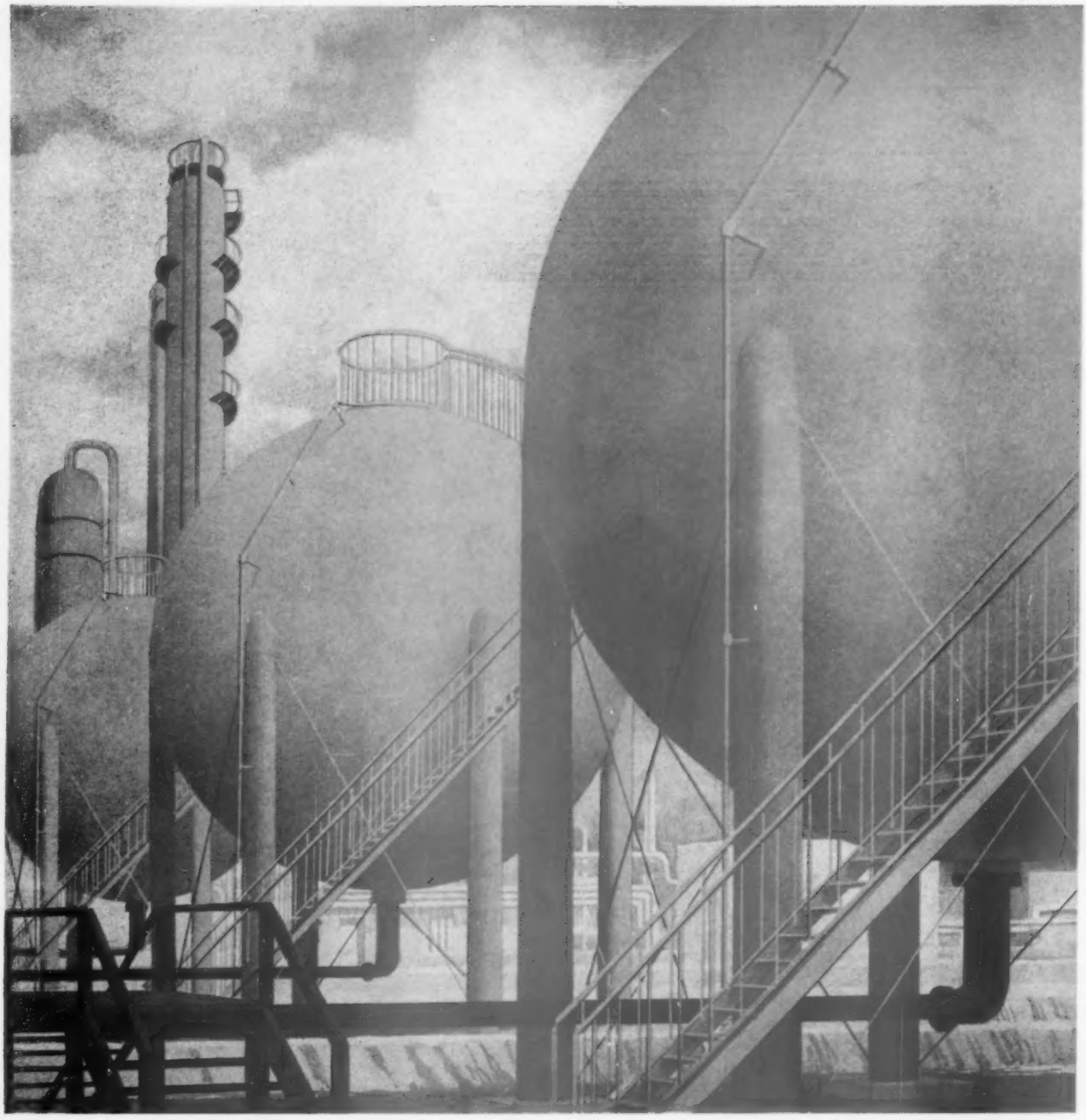
C. H. WHEELER MFG. CO.

PHILADELPHIA 32, PENNA.

Engineering and Sales Representatives in the Principal Cities

XLIPPEL VALVES, INC. • SMART-TURNER MACHINE CO. LTD. *Affiliates*

Shell and Tube Heat Exchangers | Sectional Heat Exchangers | Air Cooled Heat Exchangers | Tank Heaters | Steam Condensers and Ejectors | Single and Multi-Stage Pumps | Marine Auxiliary Equipment



Durable tank paints that keep uniform color

That's what you get when you specify paints made with M50® Basic Lead Silico Chromate pigment

Paints made with *M50*® Basic Lead Silico Chromate have remarkable resistance to chalking and color change, even in harsh atmospheres.

And Basic Lead Silico Chromate can be tinted in an unusually wide range of colors—colors that can convert your tanks and installations into attractive goodwill builders for you. *M50* pigment also provides excellent rust inhibitive properties and outstanding weather resistance.

M50 pigment can be used in every coat, to build up "Defense-in-Depth" against corrosion and weather-wear.

The anti-corrosive action goes from the primer up through the finish coat. The durability goes from the finish coat down through the primer.

• • •

Next time you buy paint for decorative metal protection, specify paints made with *M50* Basic Lead Silico Chromate.

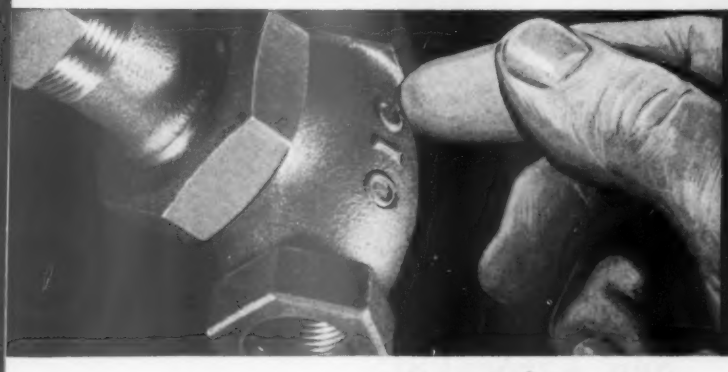
M50 an oncor *Pigment... A Development of* National Lead Company

General Offices: 111 Broadway, New York 6, N.Y.

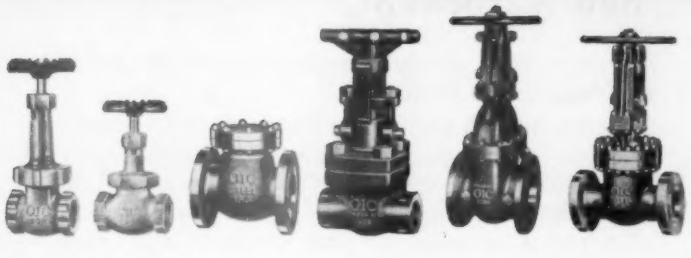
MEN WHO SPECIFY VALVES...

HEAR MORE ABOUT OIC VALVES!

SEE MORE AND MORE OIC VALVE INSTALLATIONS!



INSIST ON OIC FOR ALL VALVE APPLICATIONS!



You pay no premium for quality when you specify O I C. Special emphasis on design and manufacture . . . frequently in excess of industry specifications . . . assures you complete operational reliability, long life, reduced maintenance and easy access to vital working parts. A nation-wide distributor organization is ready and willing to advise you on the best valve for your particular application.

OIC VALVES

BRONZE, IRON, FORGED STEEL, CAST STEEL AND DUCTILE IRON VALVES

INDUSTRIAL DISTRIBUTORS SERVING INDUSTRY COMMERCIALLY THE RIGHT HAND OF PRODUCTION

THE OHIO INJECTOR COMPANY, WADSWORTH, OHIO

10816-OIC

The Ohio Injector Company
2/ Main Street, Wadsworth, Ohio.
O I C quality is essential to my operations. Please send me complete information.

Name _____
Company _____
Product _____
Street _____
City _____ Zone ___ State _____

Photographed at DX Sunray, (Tulsa Refinery)

For higher yield... new Aerocat 3C

CAN YOU USE a higher yield of gasoline—? or of propylenes or butylenes—? Then investigate the new AEROCAT 3C! It's a new fluid cracking catalyst composition, developed by Cyanamid in cooperation with a major oil company. AEROCAT 3C-12 gives increased gasoline yield . . . AEROCAT 3C-20, increased propylene and butylene yields . . . both at the expense of dry gas and coke.

In actual commercial operations, these new three-component catalysts have proved their ability to provide refiners with more flexible, more profitable operation. They are highly active, exceedingly stable, and completely operative.

Your "Man with the Golden Rule"—your Cyanamid salesman—will be glad to work with you to determine the suitability of AEROCAT 3C for your needs. He knows catalysts—and behind him are the resources of a major producer of both catalysts and other chemicals. Why not call him now?

Basic in catalyst chemistry

CYANAMID

AMERICAN CYANAMID COMPANY • REFINERY CHEMICALS DEPARTMENT • BOUND BROOK, NEW JERSEY

KEY TO OIL FINANCING

National Bank of Tulsa . . . The Oil Bank of America . . . continues to key its own progress to the healthy growth of the oil industry. Financing is the key to the oil industry's growth, and NBT has grown with the industry by continually expanding its services to finance oil operations for oil men across the nation. When you transact business in the New World of Banking at NBT, you deal with oil men like yourself . . . at the Oil Bank of America.

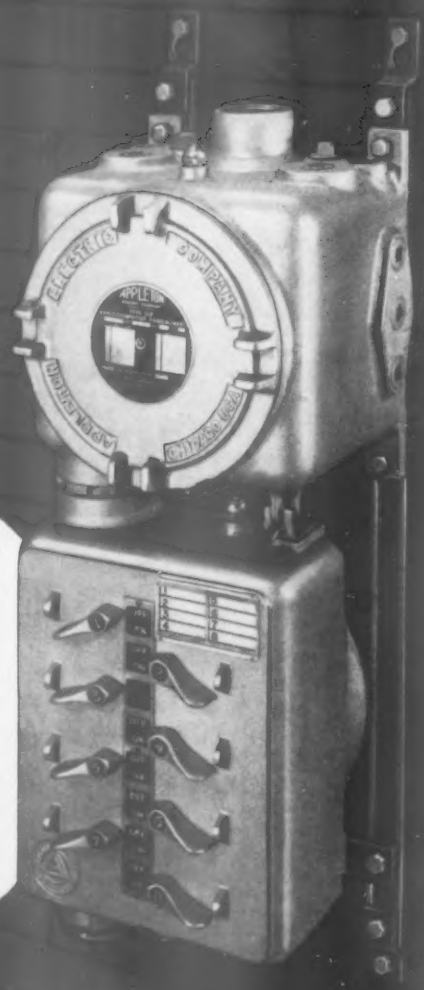
NATIONAL BANK OF TULSA

member federal deposit insurance corporation

NEW "EDP" WITH EXCLUSIVE APPLETON ENGINEERING FEATURES

"NEW ESP" ECONOMY SERIES

The unit is fully factory wired and sealed. No wiring is necessary in breaker compartment.



NEW APPLETON®

EXPLOSION-PROOF PANELBOARDS

EDP represents an entirely new, distinctive engineering advance in panelboard design.

EDP features a unique exclusive PIVOT between junction and breaker housing. This is the *Key* to Compact Size, Plug-In "E" Frame Breakers, Easier, more Convenient Installation, Quicker Main and Branch Wiring and Simplified Maintenance.

APPLETON EDP panelboards are engineered to handle motor control, machinery, alarm, lighting and a wide range of circuits requiring breaker capacities of 15, 20 or 30 amperes. They are available for 4 to 24 single pole, 2 to 12 double pole and 2 to 8 three pole circuits in various wiring systems.

Field wiring consists of connecting main and branch lines to pressure type terminals. Terminal boards are numbered for easy identification.

NEW ESP ECONOMY SERIES

ESP is compact, rugged, dependable and low cost. It embodies many unique features that provide easy installation, convenient maintenance, maximum safety and long life.

ESP is available for four single pole circuits, or two double pole circuits.

Twenty-eight page fully illustrated and detailed catalog is just off the press. Write for your copy now. Bulletin 661.

APPLETON® *electric company*

1701 Wellington Avenue, Chicago 13, Illinois

instead of just carbon steel tubing, say TIMKEN® CARBON STEEL TUBING

People who visit the Timken Company's steel plants are sometimes surprised to see carbon steel tubing being made by the same careful practice used for alloy steels. Extra care in melting, careful conditioning of billets, all the special inspection methods that safeguard Timken® fine alloy steel also apply to our carbon steel tubing.

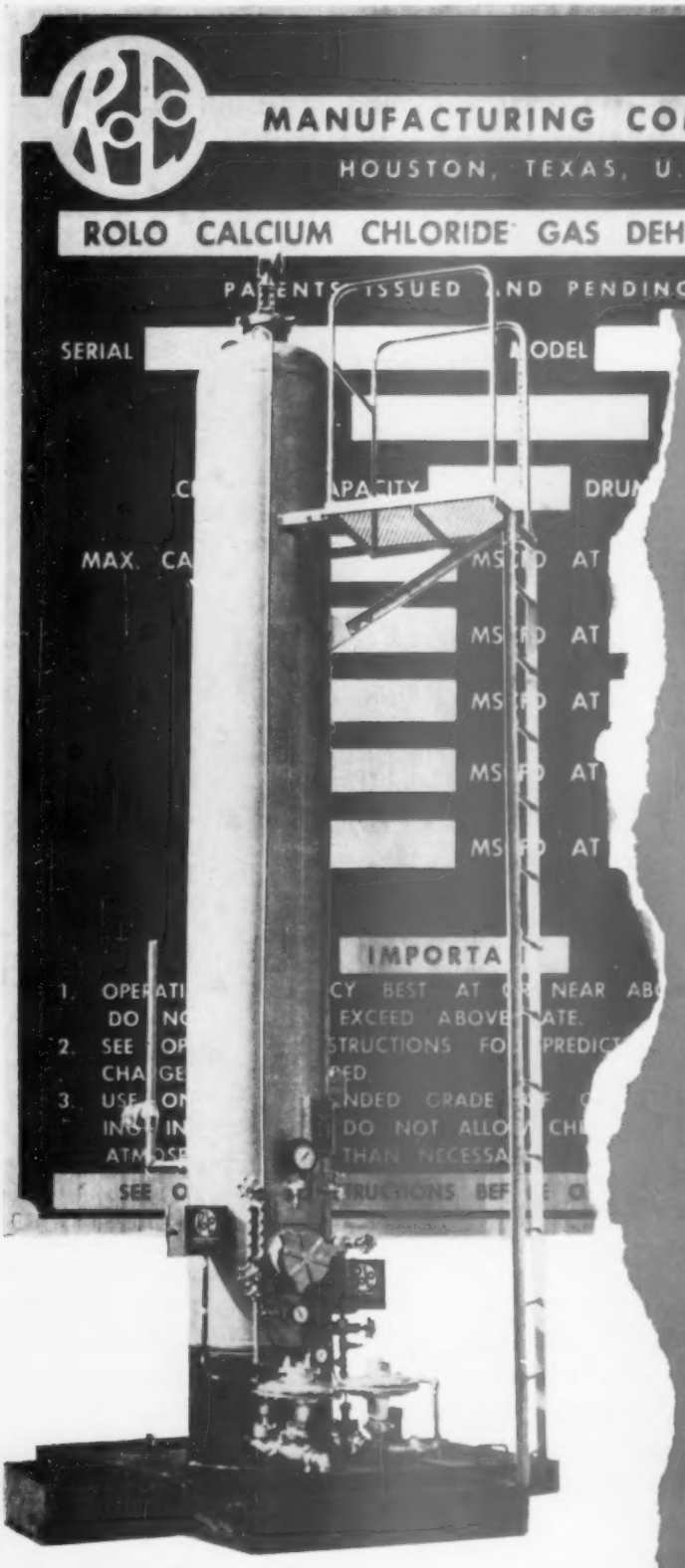
That's why Timken carbon steel tubing is better. And you pay nothing extra for it. In fact, you pay less because our precautions pay off in better uniformity and concentricity. You may be able to buy a lighter tube that will finish to your required dimensions.

Next time you need carbon steel tubing, call the experts. Let the Timken Company's Tube Engineering Service calculate the tube size which will give you the best value for your dollar.

The Timken Roller Bearing Company,
Steel and Tube Division, Canton 6, Ohio.
Also manufacturers of Tapered Roller Bearings and Removable Rock Bits.

TIMKEN® FINE ALLOY STEEL

TIMKEN ALLOY STEEL AND SEAMLESS STEEL TUBING ARE AVAILABLE FROM STEEL SERVICE CENTERS IN MORE THAN 40 CITIES IN THE UNITED STATES



ROLO CALCIUM CHLORIDE GAS DEHYDRATORS provide lowest dewpoints with minimum operating and maintenance costs.

The

ROLO OIL AND WATER METERS provide consistently efficient, accurate production metering.

ROLO METERING SEPARATORS separate and meter production in the same vessel.

Your guarantee of top perform

The entire Rolo line of metering and dehydration equipment gives you high accuracy and dependability, along with years of service. Rolo, the world pioneer in metering equipment, produces metering and dehydration equipment for every oilfield need.

ROLO OIL AND WATER METERS have ultrasimple controls and few moving parts. Unmetered liquid cannot pass through the Rolo three-position valve. Rolo meters have no minimum rate. They are available in two lines: Rolocheck® meters with the accuracy required for royalty payments; Economy Line Meters with necessary accuracy for well-test data.

ROLO WELLCHECKERS are skid- or trailer-mounted metering units for testing individual wells. These automatic units are operated in oilfields where conventional oil-gas separators are used.

ROLO METERING SEPARATORS separate and meter production. These integral units cost less than individual separators and meters. Both two-phase (oil-gas) and three-phase (oil-gas-water) separators are available, with or without heaters.

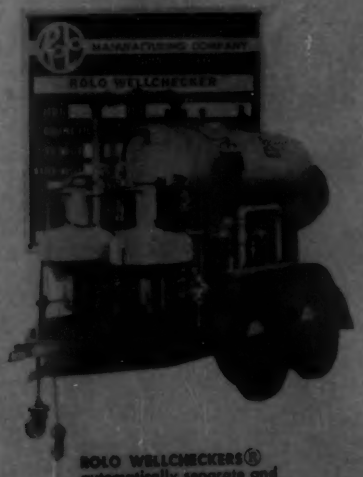
ROLO HI-CAP® metering separators handle flow rates up to 50,000 bpd and meter crudes with viscosities higher than 100,000 SSU. They are available in both vertical and horizontal models.

ROLO METERING TREATERS use a thermostatically-

ROLO emblem!

ROLO ACT SYSTEMS meet all requirements for accuracy and dependability in service.

ROLO METERING FREE-WATER KNOCKOUTS require no gas pressure to operate because they use pressure from the well pump to discharge liquids.



ROLO WELLCHECKERS® automatically separate and meter production, can be skid-mounted or trailer-mounted.

ance from metering equipment, gas dehydrators, and ACT systems

controlled heater and a hay section to break emulsions. Oil and water are metered in the same vessel.

ROLO METERING FREE-WATER KNOCKOUTS are used where gas pressure is not available. Pressure from the well pump is used to discharge liquids. Units can be mounted on trailers or skids.

ROLO CALCIUM CHLORIDE GAS DEHYDRATORS give you *high efficiency*, reducing the dewpoint of outlet gas to a minimum. This efficiency results from combining Rolo's flow design with the dehydrating effectiveness of calcium chloride. Hundreds of Rolo dehydrators are now in the field meeting, and often exceeding, pipeline specifications for water content. Both initial cost and operating costs of Rolo dehydrators are low because expensive pumps and regeneration systems are eliminated and the costs of daily inspections and maintenance are avoided.

ROLO ACT SYSTEMS are guaranteed to meet all standards for accuracy and dependability. Rolo manufactures both positive-volume (dump-type) and positive-displacement systems. These units do not lose pump suction and do not allow gas to be blown down the line during pressure operation. Temperature compensation keeps accuracy high. Rolo ACT systems can be supplied in sizes to handle all flow rates. Individual meters or complete packaged systems can be provided.

Detailed specifications on all Rolo metering, dehydration, and other processing equipment are contained in our Condensed General Catalog. Ask your Rolo representative for a copy, or write to us at the address below.

ROLO MANUFACTURING COMPANY

P. O. BOX 22136, HOUSTON 27, TEXAS • SALES AND SERVICE OFFICES: DENVER, COLO.; ODESSA, TEXAS; NEW ORLEANS AND LAFAYETTE, LA. • CANADA: PETRO-AUTOMATION INDUSTRIES, LTD., EDMONTON, CALGARY AND REGINA EXPORT: R. S. STOKVIS & SONS, NEW YORK, N. Y.

"Skip" Scivally, manager of engineering for Wilson Supply Fishing Tool Division, holding the Jet Tube Sleeve section of the Wilson "Jet Powered" Junk Retriever.

TWO tools in ONE...
The Wilson "Jet Powered" Junk Retriever

The Wilson Junk Retriever is constructed as two tools in one . . . you have a choice! Normally, the tool is run with the Jet Tube Sleeve in place (it works on the same principle as jetting a pit), making it a true, reverse circulation junk retriever. Remove the Jet Tube Sleeve section and you have a conventional core-type junk basket. The tool may be run either way.

Results obtained when the tool is run as a reverse circulation junk retriever have been remarkable. On an 18,121 foot hole, a 3⅝" Wilson "Jet Powered" Junk Retriever recovered a 4⅛" bit cone and miscellaneous *non-ferrous* material in one run. Frequently, all three cones have been retrieved in one run.

All types of milling and coring shoes are available for the Wilson Junk Retriever, and this superior tool costs less to run!

Call your Wilson Fishing Tool man for complete information.

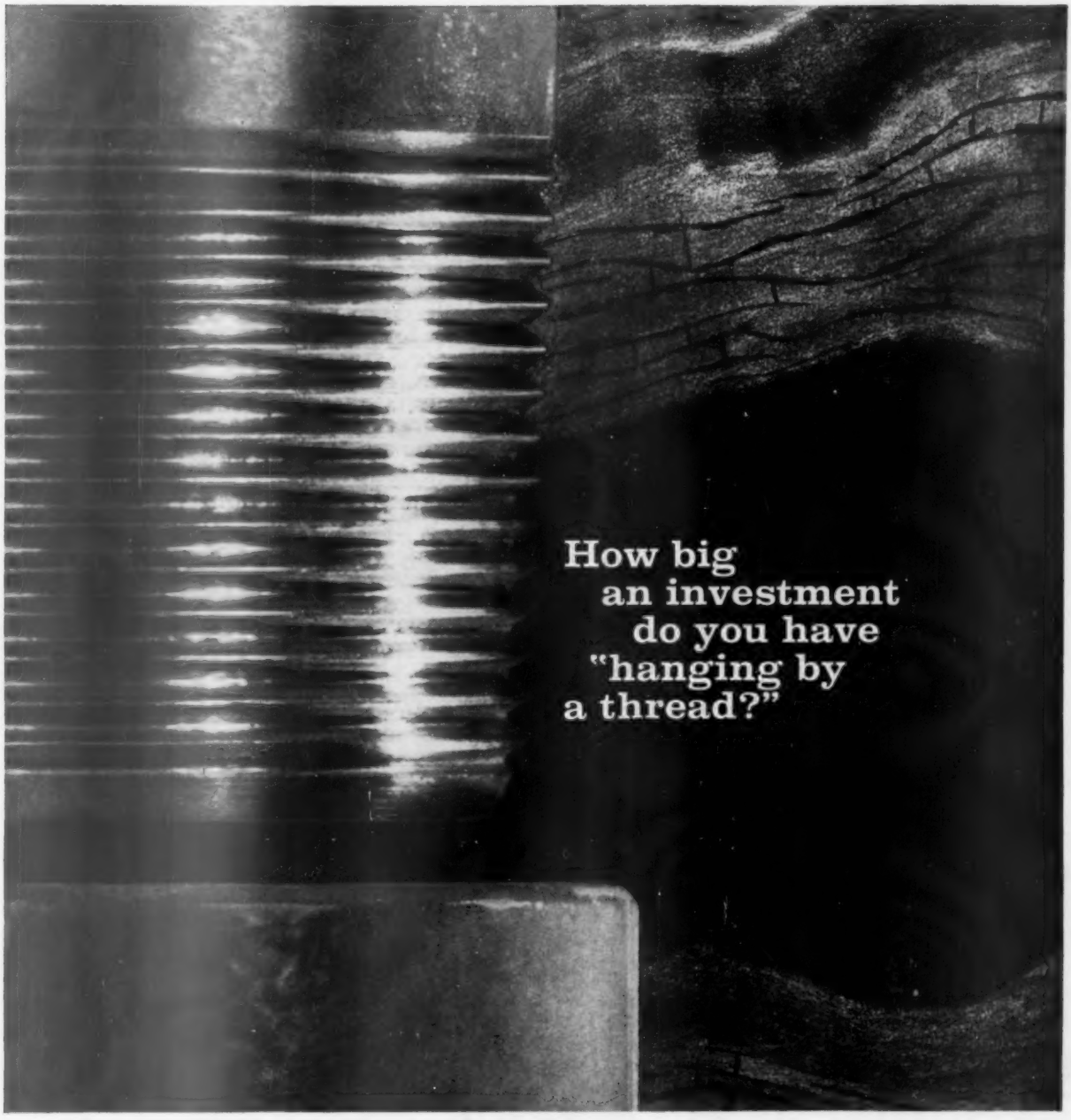
WILSON SUPPLY CO
HOUSTON, TEXAS

1301 Conti Street, P. O. Drawer 19, Houston, Texas
International Division
1301 Conti Street, Houston, Texas
Rockefeller Plaza, New York 17, N. Y.

Our 40th Year of Service to the Petroleum Industry

Oil & Gas Supplies • Tubular Goods • Production Equipment • Drilling Machinery • Packaged Compressors • Fishing Tools

6105



The deeper you go for oil the bigger your investment . . . and the deeper you go the more dependent that investment becomes on the threads that link your casing or tubing into an inseparable unit. That's why the threads for CF&I Seamless Casing and Tubing must pass the most exhaustive of tests—including painstaking checking with a contour microscope. The right lead . . . the right taper . . . the right height . . . the right size—these are some of CF&I's requirements that mean extra strength and pressure-tightness.

Available in sizes 2⅜" through 9⅝" O.D., CF&I Casing and Tubing meets API STD 5A specifications. Your nearby CF&I sales office or distributor has complete details and can provide prompt delivery. 8494

Steel . . . means strength and economy

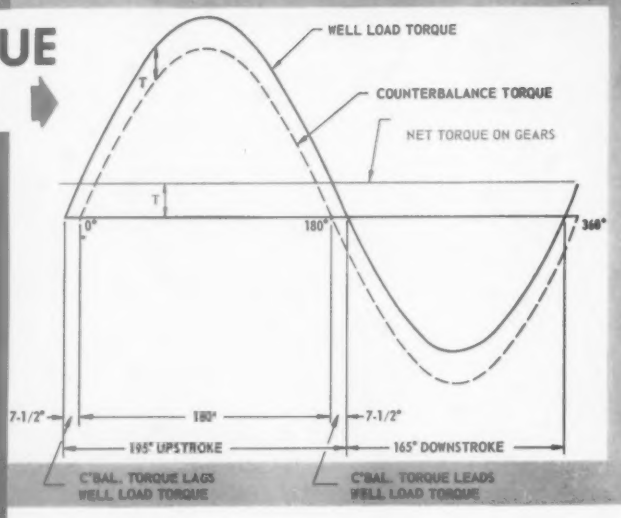
The Colorado Fuel and Iron Corporation
Denver • Oakland • New York
Sales Offices in Key Cities

SAVE ON POWER COSTS!

with LUFKIN'S MARK II UNITORQUE

IT'S THE UNIFORM TORQUE That Does it!

- REDUCES PEAK TORQUE REQUIREMENTS UP TO 35%.
- LOWER PEAKS PERMIT USE OF SMALLER PRIME MOVERS.
- REDUCES ELECTRIC POWER COSTS WHERE CHARGES ARE BASED ON CONNECTED HORSE-POWER OR PEAK DEMAND.
- UNIFORM TORQUE INCREASES GEAR AND BEARING LIFE.



HERE'S HOW . . .

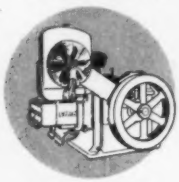
By placing the pitman cross yoke forward of the vertical centerline of the crankshaft the upstroke occurs during 195° crank rotation and the downstroke 165°. This lowers the upstroke acceleration where the load is greatest, effecting a reduction of polished rod load.

The forward position of the cross yoke substantially increases the mechanical advantage for lifting the load and reduces the advantage on the downstroke where the load is less.

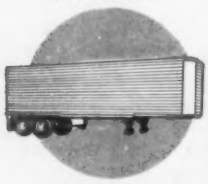
The counterbalance weights, being offset approximately 24° on the crank, produce a counterbalance torque which "lags" the well torque at the beginning of the upstroke by 7½° and leads the well torque by 7½° at the beginning of the downstroke. (See illustration above)

Independently, these features would not produce a uniform torque, but working together a "unitorque" system is obtained which in turn can effect a torque reduction on the gear reducer up to 35%.

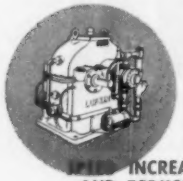
PUMPING UNITS



GAS ENGINES



TRAILERS



INCREASERS AND REDUCERS

LUFKIN FOUNDRY & MACHINE COMPANY

LUFKIN, TEXAS

Branch Sales and Service Houston • Natchez • Corpus Christi • Lafayette • Dallas • Kilgore • Odessa • Hobbs • Great Bend • Denver • Shreveport • Wichita Falls • Los Angeles • Bakersfield • Casper • Oklahoma City • Sidney • Midland • Farmington • Tulsa • New York • Maracaibo, Venezuela • Anaco, Venezuela • Buenos Aires, Argentina • Talara, Peru • Rio De Janeiro, Brazil • La Paz, Bolivia

Lufkin equipment in Canada is handled by THE LUFKIN MACHINE CO., LTD., 9950 65th Avenue, Edmonton, Alberta, Canada, Regina, Saskatchewan, Canada

"What kind of Pumping Control do YOU need?"

Square D can deliver it from Stock!

BASIC PANEL can be tailored to fit your needs—

- NEMA Type 3 "weatherproof" enclosure protects against rain, sleet, hail, snow and dust.
- simplified installation—convenient knockouts for easy wiring, designed for either wall or pole mounting, or available with pedestal mounting feet if desired
- oversized enclosure permits field installation of additional features if required
- choice of fusible disconnect switch or circuit breaker
- HAND-OFF-AUTO selector switch
- available in ratings up to NEMA Size 4 to handle up to 100 hp

COMPLETE PROGRAMMING PANEL has every feature you need for oil well pumping—

- two types—one for operation up to 600 volts, another for 762-volt systems
- gasketed inner door isolates "live" parts—NEMA Type 3 enclosure gives complete weather protection
- overload relays in separate ventilated compartment to prevent nuisance tripping
- time clock has trip tabs for easy pumping program setup
- undervoltage release relay drops out on power failure, provides time-delay restart for staggered starting when power is restored
- built-in lightning arrester

Write for Bulletin 8944. Square D Company, 4041 North Richards Street, Milwaukee 12, Wis.

SQUARE D COMPANY

—wherever electricity is distributed and controlled

PROGRESS REPORT . . . From: Petróleos Mexicanos

PEMEX FERTILIZER PLANTS AID AGRICULTURE

THE END OF THE YEAR will see the completion of two of the three anhydrous ammonia plants comprised in the program now under development by Petroleos Mexicanos to establish a petrochemical industry for the production of basic chemicals. In fact, the one at Minatitlan, on the Gulf coast of the Isthmus of Tehuantepec began operating on October 15; the second will be inaugurated next December. It is located in Salamanca, Guanajuato, marketing center for the richest agricultural area in Mexico.

Initial capacity of each of the plants will be 200 tons daily; but forseeing a much greater demand, all installations—especially the Minatitlan plant—were so designed as to make possible the addition of units in the future.

The ammonia produced at Minatitlan will be sold to a private company, Fertilizantes del Istmo, S.A., for the manufacture of Nitric acid, ammonium nitrate, and urea. With those products, plus phosphate rock imported from Florida, a full range of fertilizers will be produced which will supply the demand of the Pacific and Gulf coasts agricultural regions. This industrial complex, located in the Isthmus, on the deep-water harbor of Minatitlan-Coatzacoalcos, will have the physical facilities to export fertilizers at competitive prices. The general planning was conceived so as to provide highly efficient plants capable of operating at low costs per unit to meet prices in the Mexican as well as in export markets.

The anhydrous ammonia produced at the Salamanca plant, located in the geographical center of the country, will be used mainly to make urea which will be used largely as fertilizer and, in lesser amounts, as a component for making cattle feeds and plastics. This is another example of private capital's cooperation with Petroleos Mexicanos. Fertilizantes del Bajio, S.A. will buy 100 tons per day.

Several smaller firms will take the remaining 100 tons daily and use them to produce solid fertilizers of different kinds, or to be distributed unprocessed as fertilizer.

The Minatitlan plant is relatively close to the big gas-producing fields of the Southern district, and the Salamanca plant is 649 miles away. The latter will be fed through a new gas line already in operation and running from the southeast toward the center of the country.

In these comments about the Mexican petrochemical program, two attendant facts are worth mentioning: The close cooperation between government capital, represented by Petroleos Mexicanos as producer of the basic raw materials, and private capital as investor in the plants manufacturing end products. Another example of cooperative efforts is the use of Mexican natural gas and imports of phosphate rock from the United States.

The Minatitlan and Salamanca plants will revolutionize the fertilizer industry in Mexico. And, since the construction of these new plants represents only the first step toward a broader plan to accelerate agricultural development, it can be concluded that, in addition to their industrial value per se, they are also of great social and economic significance for Mexico.

One of the most serious problems facing the nation is the loss of the soil's fertility at a time when the population is rapidly growing. Thus, the use of fertilizers as a general practice in the Mexican agriculture, will mean that abundance will take the place of scarcity.

PETROLEOS MEXICANOS

México, D.F., México

Advertisement

ON THE LINE
OR IN THE HOLE

STANDS FOR
SAVINGS AND PROFITS

LIGHTWALL... LESS WEIGHT... MORE FLOW-THROUGH

Southwestern Lightwall has *earned* its reputation as the profit-pipe — earned it through greater savings in initial cost, transportation and handling, installation. The greater I.D. of Lightwall — compared to standard wall — means more flow-through, higher profits.

BIG SAVINGS IN SLIM HOLE AND MULTI-ZONE COMPLETIONS

High-quality Southwestern integral-joint tubing can save up to 30% as compared to conventional completion costs. Southwestern tubing conforms to applicable parts of API 5A standards and is interchangeable with API 10Rd. non-upset tubing. Send for our brochure with complete specifications.

LICENSED BY THE AMERICAN PETROLEUM INSTITUTE

Sales Offices In Midland, Dallas and Tulsa

SOUTHWESTERN PIPE, INC.

P. O. BOX 2002 HOUSTON 1, TEXAS PHONE CAPITOL 4-0631

Skyrocketing

IN POPULARITY

WEB WILSON TONGS

Leader in performance through advanced design and superior construction

• Lower initial cost • Proved lowest maintenance cost • Self-locking latch • Only 3 jaws required • Special alloy heat treated steels • Types for all sizes of drill pipe, tubing and casing.

SOLD ONLY THROUGH SUPPLY STORES

"Matched Tools for Unmatched Performance"

OUR 43d YEAR OF PROGRESS

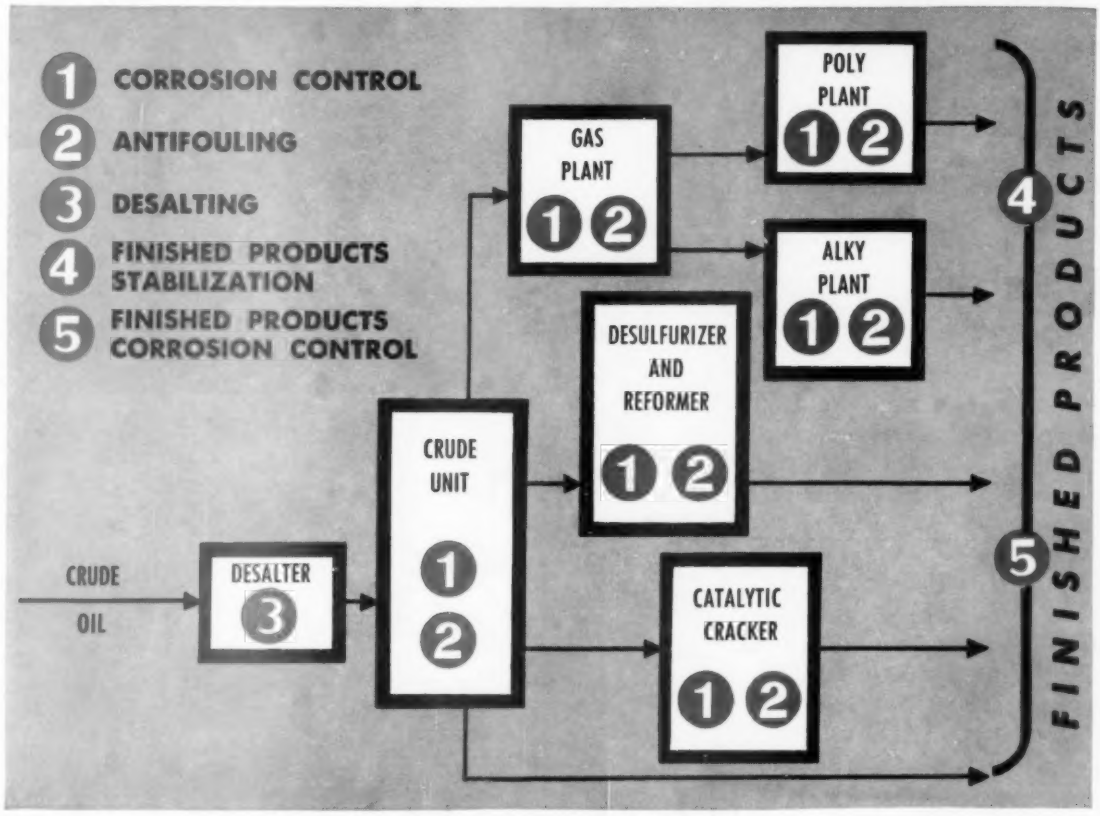
JOY

BAASH-ROSS

DIVISION OF JOY MANUFACTURING COMPANY

GENERAL OFFICES: HOUSTON, TEXAS

You're Buying RESULTS When You Use These Specialized Nalco Refinery Programs:



Nalco has the technical manpower, field proven products, and experience in the refinery to see that you get results when you use the refinery programs listed above. The Nalco policy of continuing service is your positive assurance of program maintenance and follow-through to obtain best results under all operating conditions.

Worry-free Protection

You, personally, can probably recall instances where unsuspected corrosion or fouling, and salt carryover, have increased downtime and equipment replacement costs. Finished product degradation has resulted in loss of salable distillate, or increased cost due to need for rerunning. These are the troubles Nalco prevents . . . the troubles refiners and marketers have stopped worrying about after buying the Nalco program. Even in smoothly-running operations, Nalco can reduce costs and/or improve overall operating performance and product quality. Investigate the Nalco programs listed above! You will *profit* from the *results* you buy.

Teamwork in Action

Your Nalco Representative is backed by the entire staff of the Nalco Petroleum Industry Chemicals Department when he works on your problems. He is one of the Nalco team of experts that includes specialists in every phase of the petroleum industry. With his experience and background in refinery operations, your Nalco representative can be most helpful in defining your problem and the results you buy from Nalco. Give him a call today. For up-to-date information on Nalco refinery programs, ask for Nalco Technical File G.

NALCO CHEMICAL COMPANY
6242 West 66th Place • Chicago 38, Illinois
Subsidiaries in England, Italy, Mexico, Spain, Venezuela and West Germany
In Canada: Alchem Limited, Burlington, Ontario

Nalco®
...Serving the Petroleum Industry through Practical Applied Science

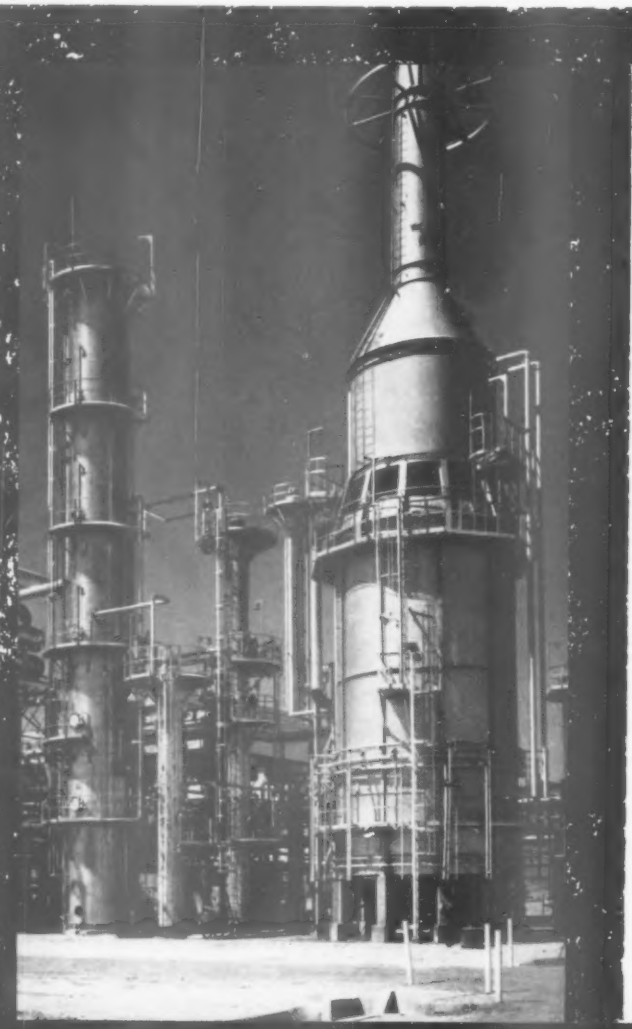
Nalco CHEMICALS
Nalco SERVICES

Procon completes African refinery 4 months ahead of schedule

Sixteen months to build a refinery in Mozambique . . . on the east coast of Africa near the port of Lourenco Marques . . . at considerable distances from the industries where almost all the refinery equipment had been constructed.

But build it Procon did! Not in 16 months—but in 12 months. Four months ahead of schedule! A modern 12,000 BSD refinery, it includes Platforming®, Unifining®, Merox™, and crude distillation units plus complete supporting facilities.

On stream for Sociedade Nacional de Refinacao de Petroleos (SONAREP) a subsidiary of the Portuguese petroleum marketing firm, Sociedade Nacional de Petroleos (SONAP), this refinery is another tribute to Procon's proven capabilities... to tackle the toughest job ...and complete it in the shortest possible time.



PROCON®

PROCON
Incorporated

1111 MT. PROSPECT ROAD
DES PLAINES, ILLINOIS, U.S.A.
World-Wide Construction for the Petroleum, Petrochemical and Chemical Industries.

PROCON INTERNATIONAL S.A.,
CHICAGO, ILL., U.S.A.

PROCON (CANADA) LIMITED,
TORONTO, CANADA

PROCON (GREAT BRITAIN) LIMITED,
LONDON, ENGLAND

PROCON PTY. LIMITED,
SYDNEY, AUSTRALIA

PROCOFRANCE S.a.R.L.,
PARIS, FRANCE

PROCON LIMITADA,
SAO PAULO, BRAZIL

PACIFIC PROCON LIMITED,
MANILA, P.I.

VICAPROCON, S.A.,
CARACAS, VENEZUELA

To drive this pump,

ten 3V Gates Super HC V-Belts transmit power that would require 21 conventional B-section V-belts.

3/8" 3V

1 1/16" B

How to save weight...space...cost with Gates Super HC Drive

Two types of V-belt drives were designed for this pump, used by Phillips Petroleum Co. in waterflooding operations at the South Burbank Field in Oklahoma. One was a Gates Super HC High Capacity V-Belt Drive. The other was a conventional V-belt drive.

This installation requires only ten 3V Gates Super HC V-belts to transmit power that would require 21 conventional B-section V-belts.

By installing the Gates Super HC Drive, Phillips reduced drive cost . . . saved 197 lbs. in drive weight . . . 74% in drive space . . . plus saving the cost of an outboard bearing that would have been necessary had the conventional V-belt drive been used.

All of these savings are the result of basic design changes that Gates has made in V-belt shape, construction and materials. Because of these changes, Gates Super HC V-Belts can handle up to 3 times the horsepower of conventional V-belts in the same space.

Many additional savings are possible: reduced bearing loads, longer bearing life . . . more compact guards and machine housings with lower material costs and weight . . . belt speeds up to 6,000 ft/min without dynamic balancing, often permitting use of lower cost, higher speed motors.

For expert drive design help, *and for complete technical service, contact your local Gates Man by calling your nearby Gates-stocked supply house.*

The Gates Rubber Company, Denver, Colorado

Gates Super HC Drive saves space, weight and money

Gates

Building the future on 50 years of progress

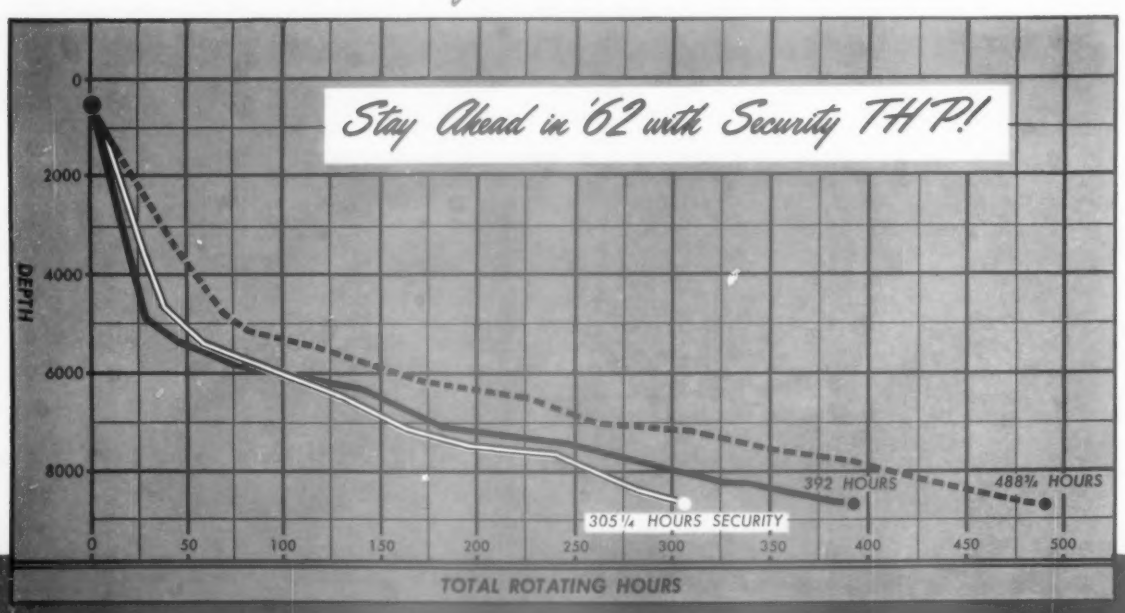
Gates Super HC V-Belt Drives

Security Meets the TO CUT COST-PER

Through Security's *total hole program* – THP... using Security bits all the way... you are assured of less cost-per-foot than in any 100% NON-SECURITY hole — with similar drilling conditions. Security assistance is available for engineering your drilling program.

Security challenges drillers world-wide to try the Security total hole program concept. Using Security bits all the way cuts costs ... increases penetration rates... contractor profits go up! Security's modern plant, quality manufacturing and years-ahead engineering-research combine to create the finest bits in the world today.

Check these Performance Per Foot Facts!



SHOWN ABOVE: Actual comparison with three of the best offset holes... non-Security bits vs. a 100% Security hole using THP. Check the over-all savings of 36¢ a foot compared with the next best offset hole above.

Challenge With *thp*
-FOOT OF HOLE!

* **TOTAL HOLE PROGRAM:** Try Security THP and stay ahead. You'll hit pay dirt faster!

Security®

ENGINEERING DIVISION
P. O. Box 13647
Dallas

Manchester, England
Whittier, California

ONE OF THE DRESSER INDUSTRIES

DRESSER INDUSTRIES, INC.

THEY SAY

A refinery overlooked

Dear Sir:

Regarding your annual pipeline issue of September 25, which included a map showing crude oil pipelines on one side and product lines on the other, together with references in the U. S. and Canada.

We note that our Alberta refinery was not included. Also, while our Sarnia refinery is shown, the capacity was given as 30,000 bbl. whereas the capacity is 50,000 bbl.

F. J. Himbury
Manager, public relations
Canadian Oil
Companies, Ltd.
Toronto, Ontario

Those drums along the gulf

Dear Sir:

I have waited 5 weeks to see if someone would question the caption of your photograph on Page 58 of the September 18, The Oil and Gas Journal.

Are the barrels shown in this photograph actually 42-gal. barrels? This would not have been as noteworthy if one of the popular news magazines had not published a similar photograph and called them only common 55-gal. drums.

D. L. Stinson
Head, Department of
Petroleum Engineering
University of Wyoming

They are 55-gal. drums.—Ed.

It's Midwest's fire flood

Dear Sir:

Your otherwise excellent coverage of the annual Society of Petroleum Engineers meeting in Dallas may have contained one error which I would like to correct.

In your writeup on the Shannon, Wyo., fire-flood project ("SPE hears the latest in fire flooding," OGJ, Oct. 16, p. 75), you indicated that Pan American "might soon undertake a full-scale in-situ combustion project."

Pan American did the research and engineering on this project for Midwest Oil Corp., which owns the Shannon pool and invested the money in the pilot test. I believe your article should have stated that based upon the encouraging pilot,

the OIL AND GAS JOURNAL

TULSA OFFICE
211 South Cheyenne Avenue
Box 1260
Phone LUther 4-4411

George H. Weber ..... Editor
Henry D. Ralph .. Chief Editorial Writer
Ted A. Armstrong ..... News Editor
Gerald L. Farrar ..... Engineering Editor
Frank J. Gardner .... Exploration Editor
Paul Reed ..... Pipeline Editor
W. L. Nelson ..... Technical Editor
Lynn M. Nichols .... Presentation Editor
John C. Casper ..... Economics Editor
W. B. Bleakley ..... Production Editor
W. A. Bachman ..... Marketing Editor
Neil Williams ..... Associate Editor
John C. McCaslin .... Geological Editor
Peter B. Bike ..... Geophysical Editor
H. S. Pylant, Petrochem. & Gas-Process. Editor
John P. O'Donnell .. Asst. Pipeline Editor

R. B. Tuttle ..... Equipment Editor
C. Dudley Johnston ..... Art Director
Robert B. Bizal ..... Editorial Research
Merle F. Blakely ..... District Editor
Sara Duncan ..... District Editor
Kenneth W. Brooks ..... District Editor
Norman K. Baxter ..... District Editor
Edward A. Martin ..... District Editor
Leslie C. Rogers ..... District Editor
Max L. Batchelder .... Asst. Pres. Editor
Helen Brown ..... Editorial Assistant
Alice Burt ..... Editorial Assistant
Aileen Cantrell ..... Editorial Assistant
Margaret Higgs ..... Editorial Assistant
Jane Adams ..... Editorial Assistant
Jo Jeanne Speaker ..... Staff Artist

NEW YORK OFFICE
500 Fifth Avenue
Phone LOngacre 4-1910
D. H. Stormont ..... Refining Editor
Paul Swain ..... International Editor
Gene T. Kinney ..... East Coast Editor
Ray G. Gibson .. Asst. International Editor

HOUSTON OFFICE
802 American Investors Building
Phone CApitol 4-7726
Ed McGhee ..... Drilling Editor
Howard M. Wilson ... Gulf Coast Editor
H. C. Bozeman Gulf Coast Refining Editor

DALLAS OFFICE
1238 Mercantile Bank Building
Phone RIverside 8-5701
Robert J. Enright ..... Southwest Editor

LOS ANGELES OFFICE
650 South Grand Avenue
Phone MAdison 2-0722
Carl J. Lawrence .... West Coast Editor

WASHINGTON OFFICE
621 Albee Building
Phone DIstrict 7-1710
Clyde La Motte ..... Washington Editor

BUSINESS STAFF

P. C. Lavinger ..... President
S. H. Rourke ... Executive Vice President
Mitchell Tucker Vice Pres. and Adv. Mgr.
K. B. Barnes .. Vice Pres., Special Projects
Hanson B. Pigman Vice Pres., Circulation
L. John Ford ..... Mgr. Industry Census
Paul McBride ..... Production Manager

ADVERTISING STAFF

TULSA OFFICE
211 South Cheyenne Avenue
Phone LUther 4-4411
Roy E. Finley ..... District Manager

NEW YORK OFFICE
500 Fifth Avenue
Phone LOngacre 4-1910
E. S. Klappenbach .... Eastern Manager
Harry B. Bullen ..... District Manager

PHILADELPHIA OFFICE
1509 Land Title Building
Broad and Chestnut Streets
Phone LOcust 3-0118
John W. Meany, Jr. .... District Manager

DALLAS OFFICE
1238 Mercantile Bank Building
Phone RIverside 8-5701
Pren G. Hollingsworth .. District Manager

HOUSTON OFFICE
802 American Investors Building
Phone CApitol 4-7726
John M. Spears .... Gulf Coast Manager
Eric F. Jeter ..... Representative

LOS ANGELES OFFICE
650 South Grand Avenue
Phone MAdison 2-0722
George O. Ruppert .... District Manager

CHICAGO OFFICE
105 West Madison Street
Phone CEntral 6-2537
Karel Wegkamp ..... District Manager
Philip S. Griffin ..... District Manager

DETROIT OFFICE
204 Washington Square Building
Royal Oak, Mich.
Phone LIncoln 7-9455
John D. Yoder ..... District Manager

PITTSBURGH OFFICE
Law & Finance Building, 429 Fourth Avenue
Room 1050
Phone GRant 1-5847
Ernest S. Holzworth .... District Manager

ENGLAND
67/68 Jermyn Street, St. James's,
London S.W. 1. Phone TRAfalgar 6318
Max F. Holsinger .. Director International Sales Operations
A. T. Chapman-Purchas and R. N. Lees
11 Tewit Well Road, Harrogate, Yorkshire
P. W. B. King
Phone Harrogate 69212

WEST GERMANY
Huttenstrasse 17, Am Ernst-Reuter-Platz,
Düsseldorf. Phone Düsseldorf 10493
Max F. Holsinger, Director International Sales operations
G. W. Rohde and E. Hillerbrand

Subscription rates to the petroleum industry United States and foreign, 1 year, $6.00; 2 years, $9.00; 3 years, $12.00. Single copies $1.00. Back copies when over a year old, $2.00.

Member
Audit Bureau of Circulations
Associated Business Publications

DEARBORN'S FULL-RANGE PRODUCT LINE SERVES ALL YOUR WATER TREATMENT NEEDS

*Check the Scoreboard!...How many of these does your plant need?**

Boiler Water Treatment, Sludge Conditioners and Anti-Foams	Dearborn® 66, 201, 240, 241, 242, 245, 247, 250, 251, 253AF, 281, 291, 659, 669, 679, 689.
Cooling Water Treatments	Polychrome® 501, 505, 525 and Dearborn 533 with Endcor® A; Dearborn 860 with Endcor B; Dearborn 143, 846, 862, 888.
Steam and condensate Corrosion Inhibitors	Super Filmeen® and Super Filmeen 20—filming amines Alkameen® and Alkatrol —neutralizing amines.
Biocides	Dearcide® 702, 703, 707, 711, 717.
Coagulant Aids	Aquafloc 420, 425, 430.
Process Antifoams	Ex-Foam® 630, 631, 635, 636.
Scale and Deposit Removers	Scale-Cleen —inhibited dry acid. Dearborn 134—inhibited hydrochloric acid.
Consulting Service	Before and after sale—covering all your potential water problems from source through reuse to disposal.
Chemical Feeding Equipment; ion exchange resins	Most complete of any water treatment company.
Experience	Three-quarters of a century—longest of any Company in the field.

*Partial list of products. Most are available in economical powder or easy-to-use briquette form.

Unfortunately, there's no panacea—no universal cure-all—for industrial water treatment problems.

That's why Dearborn's full-range product line—the most complete in the industry—is critically important. Because of it, Dearborn engineers need not "make do" with something almost good enough. They have available the exact chemical combination best suited to the job—combinations developed by Dearborn research laboratories and proved in Dearborn's 75 years of experience—longest in the water treatment field. Many of these product combinations are protected by U. S. patents and are available only from Dearborn.

Dearborn's water treatment division has eleven district offices in the United States and Canada and a trained field staff of 90 to serve you—before and after a sale. Call your nearest representative today. Or write for our Bulletin outlining Dearborn services and how they can end your water treatment problems.

DEARBORN CHEMICAL COMPANY

General Offices: Merchandise Mart, Chicago 54 • Dallas • Des Plaines, Ill. • Ft. Wayne • Honolulu Linden, N.J. • Los Angeles • Nashville • Omaha • Pittsburgh • Toronto • Havana • Buenos Aires

WELL COMPLETED

WITH NO MAINTENANCE NO LUBRICATION GROVE VALVES

Whatever the completion: single, dual, triple; whatever the service: master, wing or flow line; wherever the location: prairie, swamp or platform, Grove production valves serve you best. Designed and proved in highest pressure wells, Grove production valves offer exclusive "double-barrier" seal. First—positive metal-to-metal seal between inner seat rings and parallel sided gate; second—protected o-rings that seal and squeegee the gate clean and smooth for fast, easy open and close. For master valve service: Grove standard G-2, Balanced Stem, Dual Block, Recessed Body valves and compact Grove Valv-Pak. For wing valves: G-2's and new compact G-6's. Grove V-2's, VL-2's for flow line service. Don't just look at the selling price! Investigate how Grove production valves eliminate maintenance and lubrication costs!

GROVE PRODUCTION VALVES

GROVE VALVE AND REGULATOR COMPANY

a subsidiary of Walworth

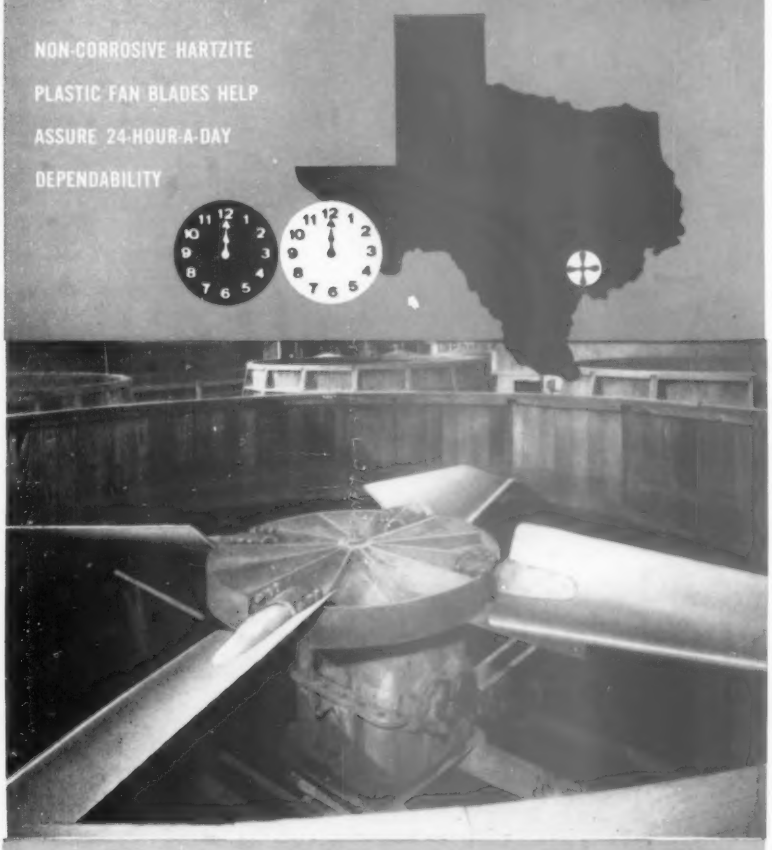
6529 Hollis Street, Oakland 8, California

Offices throughout the U.S. and in Western Canada

Hartzell REPORTS

on Cooling Tower Fans from Sinclair's Houston Refinery

NON-CORROSIVE HARTZITE PLASTIC FAN BLADES HELP ASSURE 24-HOUR-A-DAY DEPENDABILITY



At Sinclair's Houston Refinery, six 16-foot cooling tower fan blades made of non-corrosive Hartzite plastic have been delivering 24-hour-a-day dependability for over five years.

Exclusive Hartzite plastic has been proved on thousands of installations in chemical plants, refineries and power plants to be the material most resistant to corrosion and mechanical damage. It absorbs vibration and its strength is far greater than required to withstand normal stresses. In addition, adjustable-pitch, tapered blades are heavily reinforced.

Hartzell designs and manufactures cooling tower and heat exchanger fans to cover every application. It will pay you to get all the facts from your nearby Hartzell representative, or, write direct for your copy of Bulletin A-111C.

Hartzell PROPELLER FAN COMPANY

Engineering offices in principal cities
Div. of Castle Hills Corp.

HARTZELL

PIQUA, OHIO

Midwest Oil Corp. was considering a full-scale project in the Shannon pool.

H. T. Hunter
Division production supt.
Pan American Petroleum Corp.
Casper, Wyo.

Technically correct

Dear Sir:

Comments on October 23 issue: Tremendous! Wrap up of process instrumentation—especially treatment of digital computers—the most logical and succinct yet published anywhere. And it was technically correct—an almost unheard of event from most magazines to which we supply technical material.

James P. Anthony, Jr.
Weekly and Valenti
Houston

Letters to They Say should be addressed to The Editor, The Oil and Gas Journal, Box 1260, Tulsa, Okla.

CALENDAR

NOVEMBER

13-15 American Petroleum Institute, forty-first annual meeting, Conrad Hilton, Congress and Palmer House hotels, Chicago.

15-17 University of Texas, Department of Petroleum Engineering, natural gas engineering conference, Austin.

16 Illinois Oil and Gas Association, annual meeting, Mount Vernon, Ill.

17 Natural Gas Processors Association, Panhandle Plains regional meeting, Herring Hotel, Amarillo, Tex.

26-Dec. 1 American Society of Mechanical Engineers, winter annual meeting, Statler-Hilton Hotel, New York City.

27-Dec. 1 National Association of Corrosion Engineers, southeast region conference and Florida general conference short course, Key Biscayne Hotel, Miami.

DECEMBER

3-6 American Institute of Chemical Engineers, annual meeting, New Yorker Hotel, New York City.

4 AIME's Society of Petroleum Engineers, Arizona section, annual meeting, Pioneer Hotel, Tucson.

4-6 Interstate Oil Compact Commission, annual meeting, Denver Hilton Hotel, Denver.

5-6 National Petroleum Refiners, Association, computer conference for refiners, Hotel Tulsa, Tulsa.

JANUARY

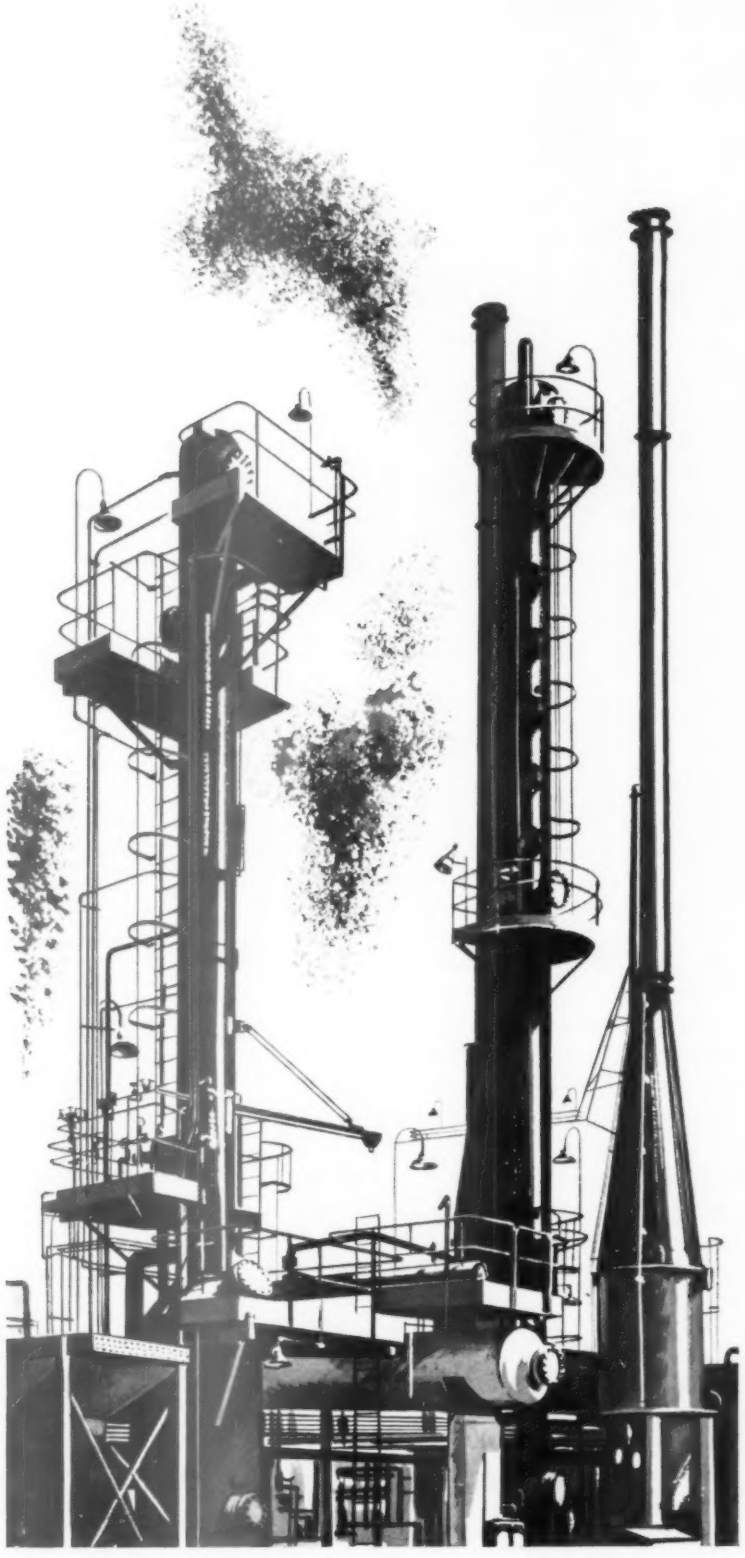
7-10 Pipe Line Contractors Association, annual convention, Boca Raton Hotel and Club, Boca Raton, Fla.

8-12 Society of Automotive Engineers, annual meeting, Cobo Hall, Detroit.

16-18 Kentucky Petroleum Marketers Association, annual meeting and convention, Brown Hotel, Louisville, Ky.

17-19 National Association of Corrosion

ISOCRACKING*



The first commercially proven low temperature hydrocracking process has achieved tremendous acceptance from refiners throughout the world. And no wonder. The process is backed by over two years of refinery operations.

Four large Isocracking plants are now going up. In California, Ohio, Mississippi and in Frankfurt, Germany, major petroleum companies will soon be processing a total of 53,000 barrels a day—and at a lower cost than ever before.

Isocracking enables the modern refiner to produce more high quality gasoline and jet fuel from refractory distillates.

With Isocracking, refineries are better able to take advantage of changes in crude supply and product demand. In short — Isocracking makes refining operations more profitable.

DETAILS?
Write to California Research Corporation, 200 Bush Street, San Francisco 20.

CALIFORNIA RESEARCH CORPORATION

A Standard Oil Company of California Subsidiary

* PROPRIETARY NAME

Texas Instruments

THERMOELECTRIC POWER GENERATOR

. . . Proved in Hugoton Field

In the Hugoton Field, near Ulysses, Kansas, a Texas Instruments 8-watt Thermoelectric Generator, installed by Cathodic Protection Service of Houston, is being used to protect well casing from electrolytic corrosion. In this area, where the cost of bringing in commercial power to each well would be prohibitive, well gas is used as the fuel . . . heat is converted directly to electric power by the Thermoelectric Generator. Since its installation earlier this year, capacity of the unit has consistently exceeded the current required.

Texas Instruments Thermoelectric Generators provide an economical, maintenance-free power source for operating unattended, remotely located equipment such as automatic controls, telemetry equipment, cathodic protection, and emergency power. Long-term reliability is assured by the rugged construction and simplicity of the "no-moving-parts" design. Operation is not impaired by full exposure to the elements . . . winds up to 100 mph have not interrupted test operations.

Write for complete information.

APPARATUS DIVISION
PLANTS IN HOUSTON
AND DALLAS, TEXAS

TEXAS INSTRUMENTS
INCORPORATED
3609 BUFFALO SPEEDWAY
P. O. BOX 66027 HOUSTON 6, TEXAS

481

Engineers, Canadian region eastern division conference, King Edward Hotel, Toronto.

19 Natural Gas Processors Association, Gulf Coast regional meeting, Robert Driscoll Hotel, Corpus Christi, Tex.

24-26 American Society of Mechanical Engineers, second symposium on thermophysical properties, Princeton University, Princeton, N. J.

31-Feb. 1 National Petroleum Refiners Association, Gulf Coast regional meeting, Ben Milam Hotel, Houston.

FEBRUARY

4-7 American Institute of Chemical Engineers, national meeting, Statler Hotel, Los Angeles.

14-17 Pipe Line Contractors Association of Canada, Castle Harbor Hotel, Bermuda.

15-17 Southwestern Legal Foundation, annual institute on the law of oil, gas, and taxation, Southwestern Legal Center, Dallas.

16 Natural Gas Processors Association, South Louisiana regional meeting, Lafayette Petroleum Club, Lafayette.

18-22 American Institute of Mining, Metallurgical, and Petroleum Engineers, annual meeting, New York City.

22 Chemical Institute of Canada, protective coatings division, Seaway Hotel, Toronto.

23 Chemical Institute of Canada, protective coatings division, Windsor Hotel, Montreal.

27-Mar. 2 International Oil and Gas Educational Center, institute on economics of the gas industry, Southwestern Legal Center, Dallas.

28-Mar. 2 American Petroleum Institute Division of Production, southern district meeting, Rice Hotel, Houston.

MARCH

1-2 Southwestern Legal Foundation, conference on economics of gas industry, Southwestern Legal Center, Dallas.

2 Ohio Oil and Gas Association, winter meeting, Deshler Hilton Hotel, Columbus, Ohio.

4-8 American Society of Mechanical Engineers, gas turbine-process industries conference, Shamrock Hilton Hotel, Houston.

6-7 National Petroleum Refiners Association, eastern regional meeting, Sheraton-Cleveland Hotel, Cleveland.

15-16 Society of Petroleum Engineers of AIME, economics and valuation symposium, Dallas.

16 Natural Gas Processors Association, Oklahoma regional meeting, Sheraton-Oklahoma Hotel, Oklahoma City.

19-22 Kentucky Petroleum Marketers Association, management institute conducted by the University of Louisville, Brown Hotel, Louisville, Ky.

21-23 New England Gas Association, annual meeting, Statler-Hilton Hotel, Boston.

21-23 American Petroleum Institute, Division of Production, southwestern district meeting, Lincoln Hotel, Odessa, Tex.

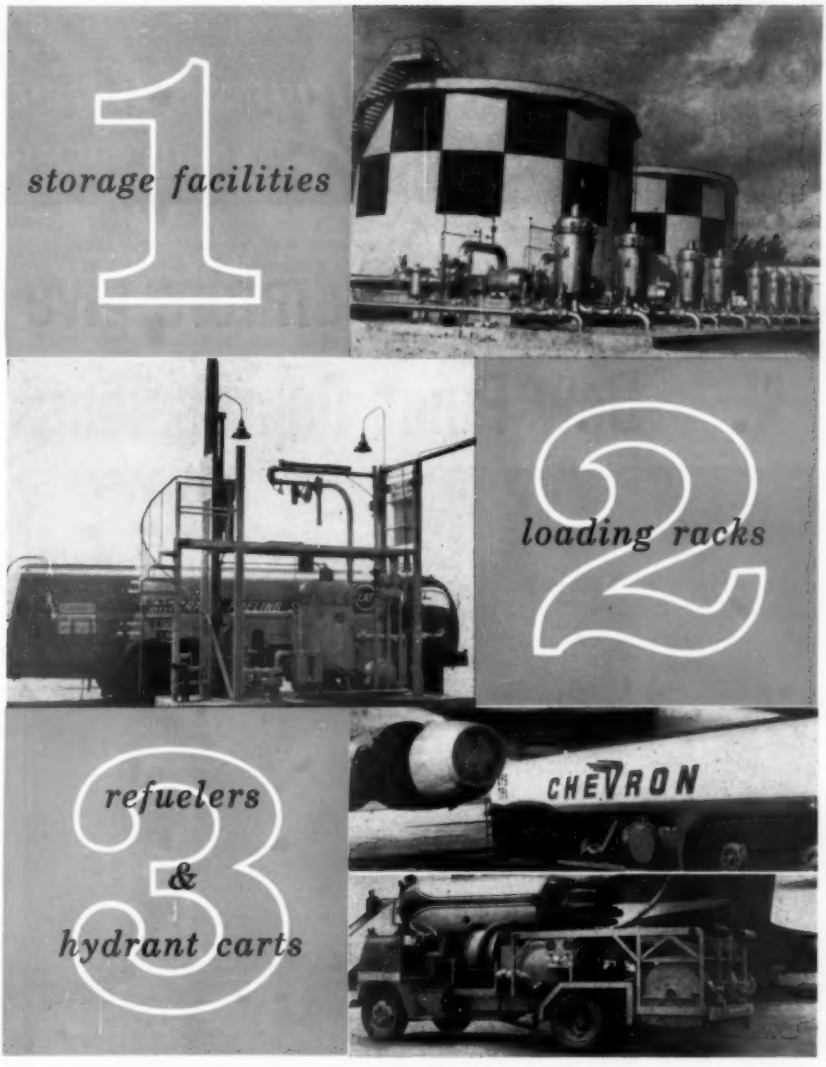
26-29 American Association of Petroleum Geologists, Society of Economic Paleontologists and Mineralogists, joint annual meeting, Fairmont Hotel, Civic Auditorium, San Francisco.

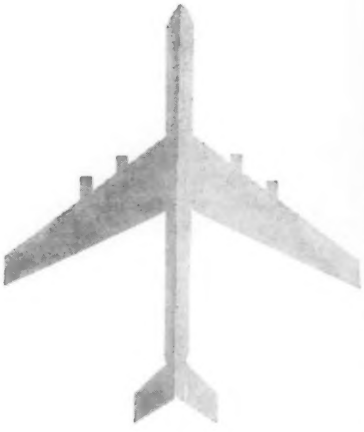
27-29 American Society of Mechanical Engineers, power conference, Sherman Hotel, Chicago.

APRIL

2-4 National Petroleum Refiners Association, annual meeting, Granada Hotel, San Antonio.

3 Chemical Institute of Canada, chemi-





Warner Lewis Separator / Filters

Your Silent Servant of Safety

CHECK JET FUEL 3 TIMES FOR SAFETY

Jet fuel picks up dirt, water, rust, scale and other contaminants in pipelines, storage tanks and feeder piping. To reduce jet engine maintenance and costly down time due to contaminated fuel, Warner Lewis 2-stage Separator/Filters REMOVE essentially all solid contaminant as well as 100% free or entrained water. Warner Lewis Separator/Filters are designed to customer specifications for the 3 basic fuel handling points serving airports: 1) storage facilities, 2) loading racks 3) refuelers and hydrant carts. Safety is of major importance to your company. Save hours of costly maintenance and protect your jets by fueling through Warner Lewis 2-stage water Separators/Filters.

WARNER LEWIS COMPANY
BOX 3096 • TULSA, OKLAHOMA

Write, wire or call:

WARNER LEWIS COMPANY

DIVISION OF FRAM CORPORATION
BOX 3096 / WEbster 9-6386 / TULSA, OKLAHOMA
IN CANADA: FRAM CANADA LTD., STRATFORD, ONT.

Engineering Progress Report
FROM UNION CARBIDE CHEMICALS COMPANY

Glycol Dehydrators give 90°F. Dew Point Depressions...

Improved regeneration systems give high glycol concentrations

There are two methods commonly used today to dehydrate natural gas: one employs glycols; the other, dry desiccants. Most authorities agree that glycol systems are less expensive in both initial and operating costs. Recent engineering advances now permit dew point depressions up to 90°F. with economical glycol-type dehydrators. Union Carbide Chemicals Company maintains an extensive engineering service group designed to help the natural gas industry obtain the best possible dehydration service with CARBIDE's diethylene glycol and triethylene glycol.

A GRADUAL IMPROVEMENT

Diethylene glycol was first used to dehydrate natural gas in 1936 and by 1939 sixteen glycol type plants were in service providing average dew point depressions in the range of 40°F. Triethylene glycol was first used to dehydrate natural gas in 1949. The dew point depressions realized with glycol type plants have gradually increased until today the standard guarantee is a 65°F. depression or gas containing seven pounds of water per MMSCF, whichever first occurs. For sometime now, some equipment manufacturers have offered a 75°F. dew point depression guarantee.

FACTORS INFLUENCING DEW POINT DEPRESSION

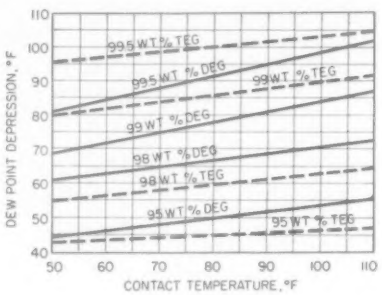
The dew-point depression obtained with a glycol dehydration plant depends upon several factors, such as:

1. Concentration of water in the lean glycol solution.
2. Glycol circulation rate.
3. Contact temperature in the top of the absorber column.
4. Efficiency of gas to glycol contact in the absorber.

Even with conservative design and operation, however, the dew point of the gas leaving the glycol contactor cannot be lower than the equilibrium value for the conditions of temperature and glycol concentration found on the top plate.

HIGH GLYCOL CONCENTRATIONS

The high diethylene and triethylene glycol concentrations now being obtained in plant practice, prompted studies to determine the dew point depressions obtainable with such solutions.



These data indicate that both diethylene and triethylene glycol at 99.5 per cent concentrations provide dew-point depressions in the 80°-105°F. range.

At concentrations of 98 per cent and lower, diethylene glycol provides better depressions than equal concentrations of triethylene glycol, while at 99 and 99.5 per cent concentrations, triethylene glycol appears to allow a 5°-10°F. lower dew point than diethylene glycol.

90°F. DEPRESSION MEETS TRANSMISSION REQUIREMENTS

Glycol regeneration equipment on the market today is capable of producing and maintaining glycol concentrations above 99%. Thus, it is possible for equipment manufacturers to guarantee a 90°F. minimum dew point depression. There are very few instances where a 90°F. depression will not meet the water content specifications of any long distance gas transmission company.

CARBIDE'S RESEARCH PROGRAM

Dew point depression studies are but one phase of CARBIDE'S extensive research activities designed to improve the products and processes of the natural gas treating industry. CARBIDE'S Technical Service Department stands ready to help you obtain the best possible results from your gas treating installations. For more information on the use of CARBIDE'S glycols for gas dehydration, call the nearest CARBIDE technical representative or write, Union Carbide Chemicals Company, Division of Union Carbide Corporation, 270 Park Avenue, New York 17, N. Y.

UNION CARBIDE is a registered trade mark of Union Carbide Corporation.

UNION CARBIDE CHEMICALS COMPANY
UNION CARBIDE

cal economics division conference, Royal York Hotel, Toronto.

4-6 API, Division of Production, Mid-Continent district meeting, Sheraton Oklahoma Hotel, Oklahoma City.

5-6 Society of Petroleum Engineers of AIME, upper Gulf Coast region, drilling and production practices conference, Beaumont, Tex.

9-10 Instrument Society of America, national chemical and petroleum instrumentation symposium, Wilmington, Del.

9-11 Mid-West Gas Association, annual meeting, Hotel Radisson, Minneapolis.

9-12 National Oil Fuel Institute, national oil heat and air conditioning exposition, Chicago.

11-12 Petroleum Industry Electrical Association and Petroleum Electric Supply Association, convention and exposition, Dallas.

11-13 API, Division of Production, Rocky Mountain district meeting, Hilton Hotel, Denver.

12-13 Society of Petroleum Engineers of AIME, production research symposium, Tulsa.

14-18 Petroleum Equipment Suppliers Association, annual meeting, Boca Raton Hotel, Boca Raton, Fla.

15-18 American Society of Mechanical Engineers, oil and gas power division conference, Shoreham Hotel, Washington.

17 Society of Plastics Engineers, Philadelphia section, regional technical conference, Sheraton Hotel, Philadelphia.

17-19 Southwestern Gas Measurement Short Course, University of Oklahoma, Norman.

17-19 American Society for Metals, regional conference and exhibition, materials and materials processing for the petroleum, petrochemical and chemical industries, Shamrock-Hilton Hotel, Houston.

23-25 American Association of Petroleum Geologists, Rocky Mountain section annual meeting, Salt Lake City.

24-26 American Society of Mechanical Engineers, production engineering conference, Van Curler Hotel, Schenectady, N. Y.

25-27 Natural Gas Processors Association annual convention, Hilton Hotel, Denver.

29-May 1 Independent Petroleum Association of America, midyear meeting, Hotel Muehlebach, Kansas City.

29-May 1 Empire State Petroleum Association, spring convention, Statler-Hilton Hotel, Buffalo, N. Y.

29-May 2 Liquefied Petroleum Gas Association, annual convention and trade show, Conrad Hilton Hotel, Chicago.

30-May 2 Southern Gas Association, annual meeting, and American Gas Association, transmission conference, Rice Hotel, Houston.

30-May 2 API, Division of Transportation, annual tanker conference, Del Monte Lodge, Pebble Beach, Calif.

MAY

2-4 API, Division of Finance and Accounting, midyear meeting, Americana Hotel, Bal Harbor, Fla.

4 Chemical Institute of Canada, rubber chemistry division, Niagara Falls, Ont.

7-8 Society of Petroleum Engineers of AIME, North Texas section, fifth biennial secondary recovery symposium, Wichita Falls, Tex.

7-8 American Society of Mechanical Engineers, maintenance and plant engineering conference, Royal Orleans Hotel, New Orleans.

10-11 API, Division of Production, Pacific Coast district meeting, Biltmore Hotel, Los Angeles.

11 Natural Gas Processors Association, Permian Basin regional meeting, Lincoln Hotel, Odessa, Tex.

11-12 Kansas Independent Oil and Gas Association, annual meeting, Broadview Hotel, Wichita.

14-17 API, Division of Refining, midyear meeting, Fairmont and Mark Hopkins hotels, San Francisco.

16-18 API, Division of Production, eastern district meeting, Deshler Hilton Hotel, Columbus, Ohio.

17-18 Society of Petroleum Engineers of AIME, production automation meeting, Hobbs, N. M.

20-23 American Institute of Chemical Engineers, national meeting, Lord Baltimore Hotel, Baltimore.

22-23 National Petroleum Refiners Association, computer conference, Hotel Tulsa, Tulsa.

22-25 API, Division of Marketing, midyear meeting, Queen Elizabeth Hotel, Montreal.

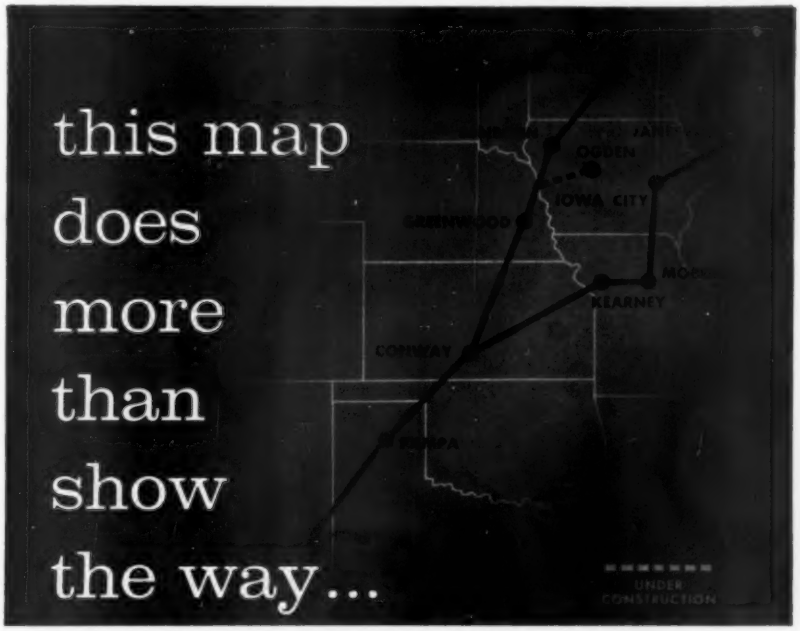
23-25 API, Division of Transportation, annual pipeline conference, Denver Hilton Hotel, Denver.

24-25 AIME, Rocky Mountain petroleum sections, annual joint meeting, Billings, Mont.

27-30 Chemical Institute of Canada, Canadian chemical conference and exhibition, Macdonald Hotel, Edmonton.

JUNE

4-6 American Society of Mechanical Engineers, lubrication symposium, Deauville Hotel, Miami Beach.



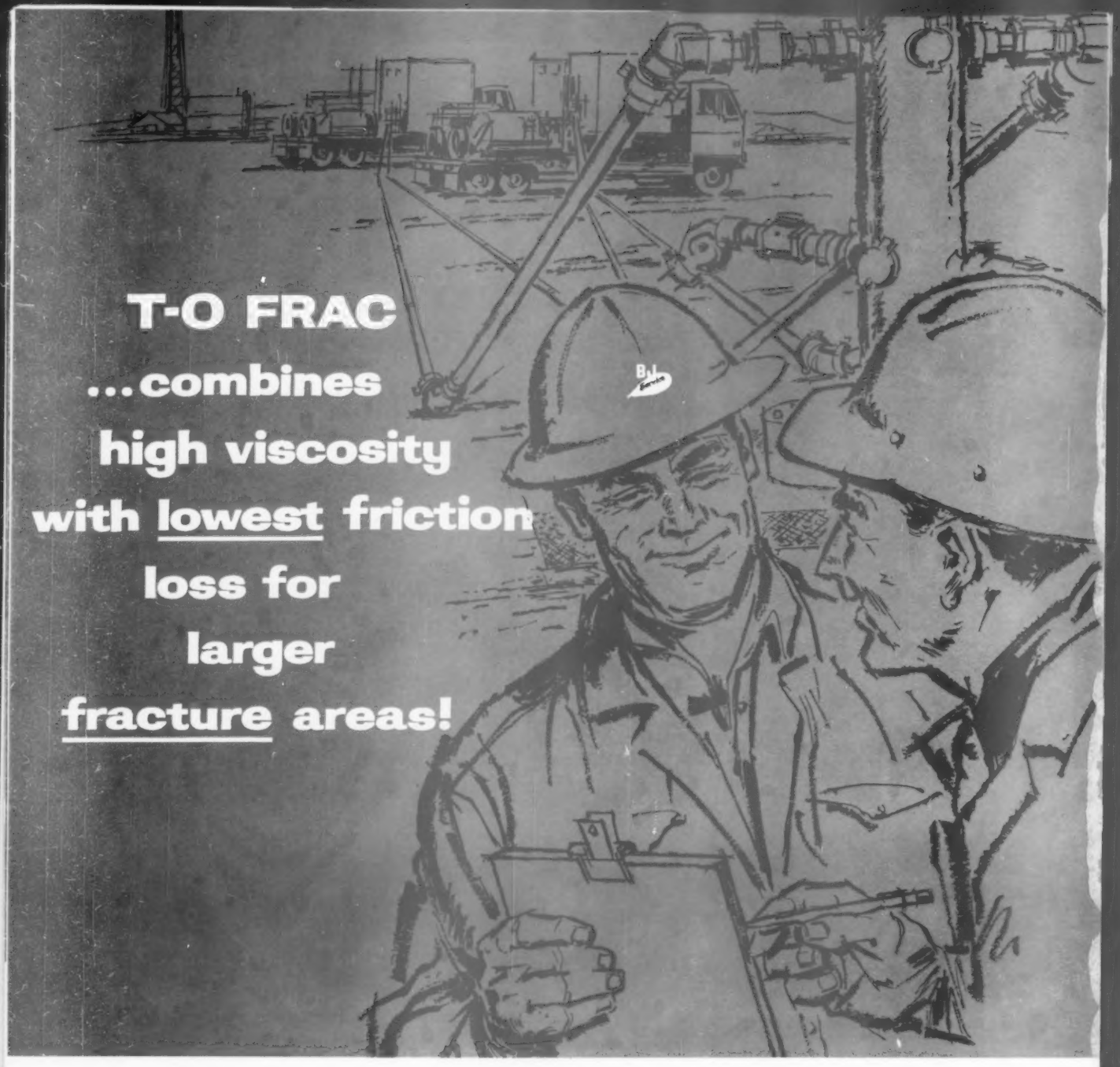
it takes you there!

If you're shipping LPG, an ordinary transportation map will show you the rail lines and highways. But those lines only point the way; delivery still depends on weather, traffic, length of route, etc. By contrast, MAP* doesn't just point the way for your shipments . . . it **delivers** them!

Do your Distributors and Customers a favor — put your products on the M.A.P.* call —

MID-AMERICA
PIPELINE COMPANY

1437 SOUTH BOULDER AVE. • TULSA, OKLAHOMA



Treatments with T-O Frac have boosted production in many "problem" wells...especially in high-pressure, high-temperature wells where screen-outs are most likely to occur. A gelled fluid, 98 per cent lease crude, kerosene or diesel oil, T-O Frac has many ideal characteristics. It is unaffected by well pressures...is stable to 240° F. It has a high plastic viscosity...a low fluid loss...and the *lowest* friction loss of any BJ fracturing fluid. T-O Frac has superior sand-carrying ability (up to 6 lbs./gal.), reducing the danger of screen-outs to a minimum. These characteristics mean deep, complete penetration into the pay...larger, more-profitable fracture areas. Breaks quickly, too, and is easily removed from the formation after treatment as pipe-line-quality oil.

For complete details, call your local BJ Service field station today.

New! COMPUFRAC electronically computes the best fracturing treatment for your well!

An advanced computer technique, COMPUFRAC solves for fracture areas at various volumes and injection rates for any number of frac fluids—does it in *seconds!* Outputs are based on calculated (not assumed) fracture widths, either vertical or horizontal. You know in advance the optimum volume and injection rate for the fluid best suited to *your* well. COMPUFRAC service available *now* at no extra cost to you. Free Technical Bulletin on request.

BJ SERVICE, INC.

A BORG-WARNER SUBSIDIARY

Long Beach, California • Arlington, Texas • Stations in all major oil fields

BJ B-W SERVICE

THE JOURNAL SAID

50 years ago

November 16, 1911

The offer of the Wichita Falls, Tex., Chamber of Commerce to pay a bonus of $10,000 to anyone bringing in the first 200-bbl. oil well within a radius of 10 miles from town still goes begging. The stipulation that it must be drilled to 2,000 ft. is keeping operators off, as a well that deep is liable to cost the operator more than the town offers as a bonus.

Fort Worth, Tex., is selected for the location of a $1,000,000 oil refinery to be built by the Pierce-Fordyce Oil Association. The new refinery will mark a major expansion of this growing company, which operates another refinery at Texas City, and is active in marketing circles.

The Tayabas oil fields in the Philippines now have a rival in a new discovery in the Province of Pangasinan, where Mr. Benitz, a Filipino, who found the field, owns large tracts of land. The oil is of fair quality but not as good as that of Tayabas.

25 years ago

November 12, 1936

Dr. W. L. Nelson, professor of petroleum refining at the University of Tulsa, is appointed Metallurgical Editor of The Oil and Gas Journal.

Gulf Oil Corp., largest producing company in the Permian basin of West Texas, is moving its West Texas headquarters into a new modern air-conditioned $35,000 building at Odessa. The building is the first air-conditioned office structure in the city and the first of its kind in the district.

Michigan oil operators who have feared an oil famine in their state are enthused by discoveries of new pools in Isabella and Arenac counties. One discovery, in Arenac County, is 45 miles north of Saginaw and 30 miles from nearest field. Discovery well blew in flowing 10 bbl. per hour from Dundee sand at 2,484 ft.

10 years ago

November 15, 1951

Socony-Vacuum Oil Co. "crystal-ball" department predicts 36% increase in demand for petroleum products over the coming 10-year period, setting free-world demand at that time at 15,000,000 bbl. daily.

M. W. Kellogg Co. starts engineering work on first major oil refinery to be built in Chile. New plant of Chilean Government's Empresa Nacional del Petroleo will have daily capacity of 20,000 bbl.

JOURNALLY SPEAKING

Same old rat race

IN WASHINGTON, the more things change, the more they remain the same.

We recently spent a week in the nation's capital, our first visit in nearly a decade. It seemed so different from when we were the Journal's Washington editor that we hardly knew our way around. But as soon as we got our bearings we realized that Washington is just the same only more so.

There are many new streets, throughways, and traffic signals, but it's still just as confusing to get around one of those circles.

There are lots of new government buildings, filled with new federal agencies which are still proliferating in a bewildering array of capital letters. The old agencies are still there, too, and while some of them have new names and most are filled with new faces they are still doing the same old things in the same old ways.

Washington used to be called the City of Magnificent Distances because the public buildings were so widely separated. Now the distances are all filled in with new buildings and many of the agencies are located far out in new suburbs, so Washington is now just the city of distances period. And it seems to be even more distant from the rest of the United States in attitude and thought processes.

We used to wear out lots of shoe leather covering those distances and trying to pry news out of Uncle Sam's minions. But our successor, Clyde La Motte, claims that he has the officials so well trained that he can sit in his office and wait for them to phone him when something happens. If there is any truth in that claim we aren't able to figure out whether the New Frontier has a more acute sense of public relations or whether Clyde has convinced the regulators that their actions don't count unless The Oil and Gas Journal records them.

Downtown there are lots of new office buildings, too, and most of them are filled with industry representatives trying to keep tabs on what the Government is doing to them. In our day four or five oil companies had a man or two each in Washington for that purpose. Now dozens of them have big staffs of specialists in the techniques of bureaucracy. We even hear that the staid old API, which tried to ignore Washington for so long, is thinking of joining the parade and staffing an office in the capital.

These industry reps spend a lot of their time trying to decide whether the Kennedy administration, which is supposed to be antibusiness, is any more antibusiness than the Eisenhower administration which was supposed to be probusiness, or whether it is just teetering between right and left of center. But they are still watching the same old trends and fighting the same old battles.

The trust busters are still suspicious of anything a big company does, the tax collectors are still trying to squeeze another dime out of practically everybody, the Federal Trade Commission is still trying to find out how gasoline is marketed, and domestic oil producers are still fighting for more government control of imports and less government control of gas.

One thing that hasn't changed a bit is the National Press Club, which is still the world's greatest center for origination and dissemination of what passes for intelligence. Some new characters have displaced some old ones at the bar, but the atmosphere and the conversation are just the same. There the syndicated columnists, political prognosticators, and special correspondents still interview each other and get the dope for their profound interpretations for tomorrow's editions.

That much we can attest to. That's where we got the dope for this column.

—Henry D. Ralph.

QUALITY
QUANTITY
SERVICE

Warren's DESIRE to serve
backed by Warren's ABILITY
(tremendous Resources of Production, Transportation and Storage) plus
Warren's EXPERIENCE as a
specialist in its field, assures you of

Dependable Deliveries of
NATURAL GASOLINE
whatever the grade, whatever the volume
WHEN, WHERE and the Way
You want it!

WARREN
PETROLEUM CORPORATION
TULSA, OKLAHOMA
EXPORT TERMINALS: CORPUS CHRISTI, PORT ARTHUR, BAYTOWN, TEXAS CITY AND WARRENGAS, HOUSTON, TEXAS, SAN PEDRO, CALIF.

Prescription for a dose of confidence

THIS WEEK'S annual meeting of the American Petroleum Institute comes at a time when there are many little signs that the industry is close to a turning point.

For some 5 years oil has been an industry in transition—dismayed with the present, concerned for the future, uncertain about its course.

Today the industry has reexamined so many of its policies and revised so many of its practices that it is in a flexible and pliable condition. A little shove could head it in the direction to share in the nation's general economic recovery.

THAT SHOVE could come from the industry leaders, acting through the API which they direct. API has access to all the facts and brains of the industry, the resources to coordinate them, and the forum to present them.

Basically the oil industry is not in as bad shape as some of its members and critics think it is. Its recent turmoil has shaken out a lot of deadwood and old concepts. Most of its units are readjusted to the point where they can adapt to changed conditions of fuels competition and shifts in consumer demands and desires.

What's needed now is some assurance that the general course of the industry is turning in the direction of sound practices which offer some prospect of stability and opportunity for profitable operation.

To be specific, the leaders of API should make use of the knowledge that they and their staff have gathered—such as the volume of crude production, refinery runs, and inventories needed to fit the demand pattern; the ways in which various marketing practices depress product prices; the way in which low product prices undermine crude prices; and the wellhead revenue necessary to sustain reserves and producibility.

The chief trouble with the oil business is that it has allowed its price structure to deteriorate to the point of endangering the income needed for future growth. The causes of this aren't hard to determine. The remedy is for a few influential companies to lead the way toward reversing the trend.

THE CURRENT INDUSTRY FEELING is that conditions are ripe for improved business except for one thing: the psychology of the industry itself.

A dose of confidence would clear the air and start the upturn.

Speeches at the API can help some. Corridor exchanges of ideas can help more. But the greatest dose of confidence would come from seeing examples set by API leaders in directing their own companies' courses toward broad-based policies for maintaining the financial stability of the industry as a whole.

NEW

JUST ADDED... THE MODEL "R"

An advanced new packer for combination production and well-stimulation operations.

BAKER MODEL "R" DOUBLE-GRIP RETRIEVABLE CASING PACKER

Product No. 642-R

A long-stroke (30") packer with simple one-turn right control-pin setting and automatic bottom.

Features a new concept in hold-downs that eliminates the chronic hold-down problems associated with conventional packers, and restores surface control of the bypass valve for pressure equalization.

Also available without hold-down for normal production requirements.

Write for Bulletin 385. Baker Oil Tools, Inc. P.O. Box 2274, Terminal Annex, Los Angeles 54, California

These are

Packer Accessories? Baker offers a complete line that makes the packers more usable and adaptable. Dual and triple string flow tubes, for instance, and plugs and other accessories.

BAKER MODEL "D" RETAINER PRODUCTION PACKER

Product No. 415-D

The most widely used drillable packer in the world. Contains continuous sealing bore and flapper-type back-pressure valve.

BAKER MODEL "DA" RETAINER PRODUCTION PACKER

Product No. 415-DA

Direct variation of Model "D" with a larger I.D. sealing bore located in the upper end of the packer. Permits larger bore through packer accessories. Used as an upper packer in two-packer flowing or pumping, parallel string hookups.

*10 Modern Production Packers

Single-Zone? Multiple-Zone? Water-Flooding? Deep Wells? Shallow? High Temperatures? Formidable Pressures? ■ The ten packers pictured here handle an impressive array of tough and simple production jobs.

*If you count the pictures, you come to number 10. But that's certainly not the total of packers made by Baker. For instance, Models "J" & "K" Snap-Set Packers are also made in double-grip versions. The Model "R" is also offered in a single-grip type. A compression packer is available. Moreover, thanks to Baker's continuing program of packer research and development, new packers that will supplement the packers pictured above are coming.

Drillable

BAKER MODEL "F" RETAINER PRODUCTION PACKER

Product No. 415-F

Related design to Model "D". Contains larger continuous bore than Model "D" Used where extra large bore is required in some parallel (triple) string, flowing or pumping hookups.

BAKER MODEL "FA" RETAINER PRODUCTION PACKER

Product No. 415-FA

Related to the Model "F" Packer in the same manner that the Model "DA" is to Model "D". Contains extra large upper sealing bore. Provides largest I.D. of any retainer-type packer. Used in multiple string hookups exclusively.

These are Retrievable

BAKER MODELS "J" AND "K" SNAP-SET DUAL PACKERS

Used as the upper retrievable packers in two or three-packer, parallel-string installations. Provides largest full-opening bores possible. For instance, 7" size has full opening for two 2⅜" tubing strings. Actuated by set-down weight only, and can be set and released as many times as required. Short string can be run and retrieved separately. Model "J" is long-string set; Model "K" is short-string set. Also available are Double-Grip versions that contain built-in, button-type, hydraulic hold-downs.

(left)
Model "J" Single-Grip Snap-Set Dual Packer Product No. 756-J

(right)
Model "K" Single-Grip Snap-Set Dual Packer Product No. 756-K

BAKER MODEL "M" SNAP-SET PACKERS

Product No. 635-M

Used as the upper retrievable packer in two-packer, full-opening, selective cross-over, tubing and annulus production hookups. Set with set-down weight. Released and recocked for repeat setting by picking up on tubing.

BAKER MODEL "A" RETRIEVABLE TENSION PACKER

Product No. 739-A

One of the shortest, most modern high-performance tension packers. Ideal for economical, low- or high-pressure water flooding. Rugged enough for many high-pressure fracturing and acidizing operations. Simple J-Slot setting mechanism.

BAKER MODEL "E" RETRIEVABLE CASING PACKER

Product No. 420-E

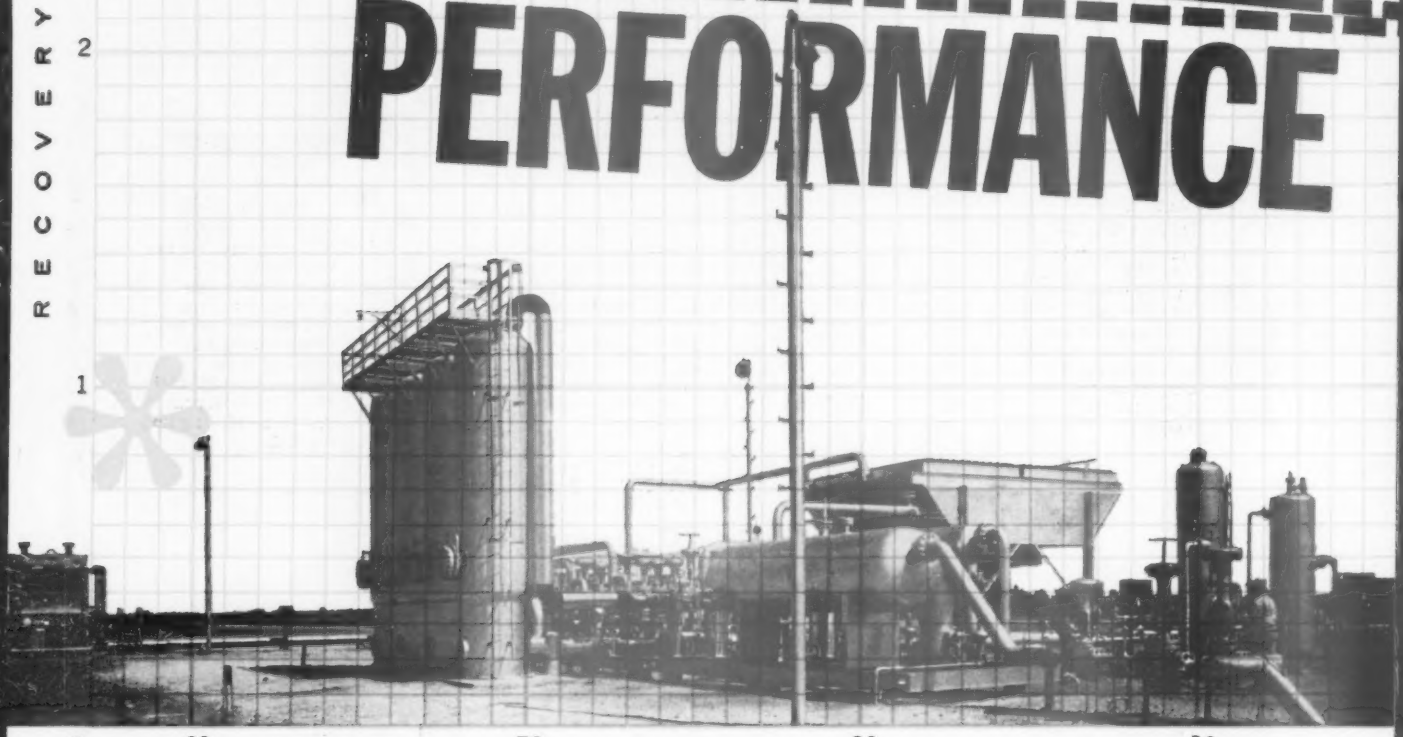
One of the shortest, most compact, set down retrievable packers available. Ideal for light or medium duty production requirements, or for all-around water flooding use. Simple J-Slot setting mechanism.

BAKER OIL TOOLS, INC.
HOUSTON
LOS ANGELES
NEW YORK

Baker packers don't go into the field alone. One of the great domestic oilfield service organizations stands behind them. Parts are always available, and so is service. So is the latest practical knowledge of how to use packers and how to set them.

BAKER

"PIGGY-BACK" PERFORMANCE



Look at the liquid recovery curves for this BS&B DRY FRAC Unit. Actual recovery rate slightly exceeds and parallels the guarantee so closely we will call it "piggy-back" performance. This takes real process know-how.

Lean streams, rich streams, sour or sweet... BS&B has the equipment to handle them all. Glycol or dry desiccant dehydration. Desulfurization or CO_2 removal. Low temperature separation with natural, mechanical, or ammonia absorption refrigeration. Or cold feed stabilization.

The economics of YOUR situation will dictate selection of the proper equipment for the highest rate of return and quickest pay-out.

Want to discuss your gas processing requirements in preparation for the big gas demand ahead? Call your nearest BS&B sales office, or write to Black, Sivalls & Bryson, Inc., Box 1714, Oklahoma City, Okla.

The new BS&B "Uniflux" Heat Exchanger is an important component of this DRY FRAC Quick Cycle Hydrocarbon recovery unit. Instrumentated with completely automatic controls to assure safe, efficient operation, "Uniflux" heats with high temperature inert gas with no flame impingement on tubes. Fast response to heat and cooling loads make it ideal for intermittent service.

Manufacturers of: Oil and Gas Field Processing Equipment, Control Valves, Safety Heads, Electronic Instrumentation, Heat Engineering Equipment, Mass Flowmeters, Filament Wound Glass Fiber Products, and Grain Storage and Processing Equipment.

1-A11

BS&B

BLACK, SIVALLS & BRYSON

OKLAHOMA CITY • KANSAS CITY • TULSA • EDMONTON • THE HAGUE

GENERAL sessions of the forty-first annual convention begin today. This is a scene at last year's meeting.

API meeting comes at critical time

Gasoline prices, problems of oversupply, politics are in the spotlight at Chicago convention, which may rank as one of API's most important sessions.

PUBLIC affairs and politics are getting top billing along with ways to create new demand for petroleum this week in Chicago.

The occasion is the forty-first annual meeting of the American Petroleum Institute which starts its formal sessions today. Before API Chairman M. J. Rathbone gavels the convention to a close Wednesday noon, more than 6,000 oil men representing every branch of the industry are expected to register.

The 1961 convention comes at a critical time in the history of the industry and may turn out to be one of the most important sessions of the organization.

Problems. Uppermost in the minds of most oil men in Chicago for the session are the triple problems of prices, oversupply, and politics.

The marketing section of the industry has just closed out a very disappointing summer gasoline season during which price wars, intensive new competition, and general product oversupply occasioned by high refinery runs have wrecked profits.

A similar situation has hit the production segment. Many producers have seen their income restricted by tight proration and a series of "adjustments" in crude prices.

And all branches of the industry have felt the growing encroachments of governmental regulation by the action of legislatures, courts, or investigating agencies.

Aspects of these problems plus the big job of stimulating new petroleum demand are expected to be aired to the general session in talks by Rathbone, API President Frank Porter, and William F. Kenney, vice president and general counsel for Shell and also chairman of the API Committee on Public Affairs.

New faces. There's also an atmosphere of "changing of the guard" in API leadership.

During the convention a new API chairman will be elected to succeed Rathbone, president of Jersey Standard, chairman during the past year.

Also being introduced around this year is Rep. Frank Ikard (D.-Tex.), who is resigning from the House to become executive vice president of API. It is generally understood that Ikard is being groomed to succeed API President Porter, who is expected to retire in a year or so (OGJ, Oct. 9, p.66).

Only one vice president of an API division is scheduled for replacement. He is Henderson Supplee, Jr., president of Atlantic Refining, who has headed API's Transportation Division the last 2 years.

The other four vice presidents were elected to 2-year terms last year. They are Gage Lund, vice president of California Standard, for production; A. P. Frame, vice president of Cities Service, for refining; Vernon Bellman, vice president of Socony Mobil, for marketing; and A. O. Savage, comptroller of Jersey Standard, for finance and accounting.

Election of new directors and

new members of the various division general committees will complete the organization details for next year's API work.

Program. Chief speakers at the two general sessions in the Grand Ballroom of the Conrad Hilton have the political flavor.

A. S. (Mike) Monroney, Democratic U. S. Senator from Oklahoma, was on the schedule as today's speaker. John M. Kelly, assistant Secretary of the Interior, and Joseph C. Swidler, chairman of the Federal Power Commission, are scheduled for important addresses.

Speakers for the division sessions:

Production—George S. Benson, president of Harding College, Searcy, Ark., talking on "Selling America's Economic System to Americans"; James A. Clark, Houston public-relations consultant, giving "The PR Potential in Production"; Lester T. Potter, president of Lone Star Gas Co., Dallas, reporting "Cooperation on Natural Gas Bill Finally Achieved," and Lyon F. Terry of Lehman Bros., New York, on "Producers' Problem of Diminishing Returns."

Refining—Henry G. McGrath and Luther R. Hill of M. W. Kellogg Co., New York, talking on "Refining or Petrochemicals — Which Will Win?"

Transportation—George P. Baker, president, Transportation Association of America, Washington, D. C.; A. L. Nickerson, board chairman of Socony Mobil, New York; and James M. Landis, New York attorney and former special assistant to the President.

Petroleum statistics—Martin R. Gainsbrugh, chief economist, National Industrial Conference Board, New York; Ira H. Cram, chairman of the executive committee of Continental Oil Co.; and J. H. Ellender, chief economist, Arabian American Oil Co., New York.

Petroleum Industry Buyers—Allison R. Maxwell, Jr., president of Pittsburgh Steel Co., and Jack Cox, vice president of Pico Drilling Co., Breckenridge, Tex.

A tremendous amount of committee work is one little-publicized feature of the API sessions. Committees started meeting as early as last Thursday, and a large number of committee sessions are scheduled each day through Wednesday.

API appreciation awards go

THE American Petroleum Institute this week honors 26 men for outstanding contributions to the oil industry.

They will receive certificates of appreciation during various group sessions at API's annual 3-day convention starting Monday in Chicago.

Units making the awards are the Division of Transportation, Medical Advisory Committee, Interdivisional Committee on Labeling, Safety, Division of Production, Committee on Petroleum Statistics, Division of Finance and Accounting, and Committee on Public Affairs.

Recipients:

Finance, accounting

W. J. Arnold
Pure Oil

Labeling

John B. Tuttle
Standard (N. J.)

Transportation

L. C. Davidson
Cities Service

L. M. Jonassen
Cleveland Tankers

Robert Maguire
Atlantic

R. K. Paine
Standard (Calif.)

R. L. Ransome
Shell Pipe Line

B. E. Rogers
Richfield Oil

D. F. Sears
Shell Pipe Line

R. M. Slough
Marathon Pipe Line

to 26 men

Public Affairs

Joseph P. Walsh
Sinclair Oil

Statistics

Maynard I. Landa
Cities Service

Safety

Walter Boon
Sun Oil

J. C. Howard
American Oil

W. E. Lovejoy
Standard (Calif.)

E. G. Miller
Humble

Production

Jack Abernathy
Big Chief Drilling

James R. Hatfield
Cities Service

Earle Hellums
Gracey-Hellums

W. P. Kliment
Crane Co.

Joseph Zaba
Pan American Petroleum

R. E. Foss
Sunray Mid-Continent

W. M. Frame
National Tube Div., U. S. Steel Corp.

Medical

L. E. Curtis
Standard (Calif.)

T. M. Frank
American Oil
(posthumous)

G. M. Saunders
Socony Mobil

Oil pushes campaigns for creation of

Gene T. Kinney
East Coast editor

THE petroleum industry may yet turn out to be the liveliest corpse ever to have its growth epitaph written by so many eminent outside economists and financial analysts.

Spurred by a world-wide surplus of producing and refining capacity, and a slackened growth rate in the U. S., the industry is making an unprecedented effort to "expand the demand."

Although there is no central industry responsibility for the over-all job, it is being carried out with vigor on several fronts. Most attention is being focused on the big-volume products—gasoline and heating oil, whose 1 to 2% annual demand increase at a time of heightened competition is causing trouble.

The programs are beginning to raise the hope that the industry—by its own imaginative, if belated, efforts—can further increase the consumption of petroleum.

Here are the origins of the new optimism:

A travel-promotion campaign by the American Petroleum Institute, the first of its kind by the industry, indicates that pleasure driving can be boosted. A pilot advertising campaign, now being evaluated, may provide the basis for a national campaign next year.

API is working to promote travel on New England's Heritage Trail—shown in this poster—which runs for 2,000 miles through six states.

Heating oil is being revitalized under the new "one-roof" organization, the National Oil Fuel Institute, which grew out of the merger of the Oil Heat Institute and the National Fueloil Council.

The combination of a new push by NOFI and competitive spirit of refiners and marketers, aided by new equipment, is producing a formidable competitor for gas and electricity in new-home business.

New uses of petroleum are being opened up for what could become sizable volumes. The most important of these is the injection of hydrocarbons into blast furnaces to reduce the cost of producing pig iron, mainly outside the U. S.

1. Travel promotion

When API's travel-development program was approved 18 months ago, there was scarcely a trace of any sales effort apart from that of pushing competitive brands. There was no organized program to increase the consumption of gasoline, the industry's big-money product.

The transformation in the short time since then is amazing, considering the still-modest size and experimental nature of the program. Armed with market-research advice that two main obstacles to more pleasure driving are lack of motivation and lack of knowing where to go, API set out to provide both.

Last spring the new Travel-Development Committee, headed by H. L. Moyer, Pure Oil Co., Chicago, kicked off the vacation season with the first large-scale automotive travel promotion in the country. The committee prepared editorial features for special sections in 20 major newspapers. And it worked to win heavy advertising support among oil companies and others with a big stake in auto travel.

Many of the vacation spots promoted in this way enjoyed record business, and this was considered more than coincidence.

Tourism drives. The API is supporting state tourism programs with an effort that goes beyond providing a cheering section.

It has participated in 14 governors' conferences on the subject, contributing promotion materials and knowhow. There is a greater demand for API aid in several other states than the staff can meet.

API is working with states to promote existing attractions. And where these attractions aren't considered sufficient to inspire travel, API is helping to create tourist meccas that will.

TDC has just developed and presented to the state of Nebraska a complete plan for an Indian community center on the Omaha Indian Reservation in Macy. The plan has been accepted by the Indians and state officials, and API is going ahead on promotion of the project.

Tied in with the Indian center is an "Old West Trail" to be designated through Nebraska, North Dakota, South Dakota, Montana, and Wyoming, offering a genuine tourist attraction that would mean a motor trip of 2,500 miles. This is in line with strategy to promote motor tours as opposed to one-destination vacations involving less travel.

API last summer also inspired and cosponsored the first National Travel Trailer Rally in the U. S. in Omaha. Tourists with mobile homes gathered from 23 states, and the rally is expected to become an annual event.

API is working with the New England Hotel Association to distribute 2,000,000 leaflets and 20,000 window posters for its New England Heritage Trail, running for 2,000 miles through six states. Promotions are being prepared on the Seattle World's Fair and the New York World's Fair for use by all interested groups.

"The Travel Development Committee works as a catalyst to bring together the various groups interested in promoting travel," reports James G. Bennett, API's travel-development coordinator. These

groups include the hotel, film and camera, mobile home, auto, restaurant, motel, and sporting-goods industries. Many are now coming to API for help.

The committee is also acting as the consultant for the International Travel Department in the U. S. Department of Commerce. The Secretary of Commerce, in carrying out the Government's drive to attract more foreign tourists and thus ease the balance-of-payments deficit, is relying heavily on API for help.

THIS technician is assembling a portable space heater which opens up new marketing vistas. It's the first commercial adaptation of an air-aspirated nozzle principle developed by Gulf Oil Heat Research Laboratories.

Company activities. Humble Oil & Refining Co. distributed almost a million Civil War maps during this year's centennial celebration.

Sinclair Oil Corp. also promoted Civil War shrines as travel attractions in its advertising.

Pure Oil Co. sponsored a Chicago-Miami motor trip for a family of four. It promoted the low travel costs of the trip in national magazines and newspapers, together with other suggested tours and their comparative costs by auto and other means.

Phillips Petroleum Co., to cite still another, ran travel ads in the states where it markets. Paul Endacott, Phillips president, took the time to develop and present an idea for world's fair promotion which is under consideration by TDC.

Ethyl Corp. continues its effective advertising campaign stimulating motorists to drive and explore the "Magic Circle" of educational, cultural, and pleasure spots around them. Ethyl also produces travel columns for newspapers and radio scripts on the subject.

Advertising pilot. Last February, a budget of $443,000 was approved for a preliminary research study, a test market-advertising campaign, and research measurements to check its effectiveness.

A series of 12 black-and-white ads and seven in color were run in 10 test cities between June 27 and September 15. The ads were aimed at instilling the desire to go, then showing the motorist where to go in his area and how to get there.

The ad agency appointed for the project has tried to gage results by telephone survey, personal interview, mail questionnaire, coupon returns from ads, mileage checks, and traffic counts at resorts advertised. The data, together with an analysis, have been turned over to the Market Research Committee for further study.

The TDC may hear the verdict this week at the API meeting in Chicago. On this recommendation may hinge a multimillion-dollar national advertising campaign, the API's first of this scope.

"On the surface," says coordinator Bennett, "indications are that the campaign succeeded in motivating people to make the trips advertised." If further research seems to bear this out, the API board will probably be asked to approve an advertising campaign as a part of a major effort to boost gasoline consumption.

2. Heating oil promotion

The heating-oil industry is coming alive with a vitality and competitive vigor that has not been seen since oil started taking a licking in the post-World War II natural-gas boom. Heating oil's competitive position is being strengthened in several ways.

NOFI program. Since its creation from two separate organizations in May, the National Oil Fuel Institute, headed by Glen L. Werly, has added 1,300 dealers to its membership.

A national advertising campaign has been approved in principle and is being developed. Dealer training and education have been stepped up to improve sales and service.

A new market-research program has been started to provide information to back up sales strategy. Oil's voice is being heard in the critical area of codes and ordinances. More effort is being directed at selling to builders and architects, and working with plumbing and heating contractors.

New-home campaign. A heavy emphasis on helping builders to sell oil-heated homes is beginning to pay off.

All of the promotional help and advertising money that the heating-oil industry is pouring into its sales drive, plus improved equipment, has impressed builders. Building-trade magazines are advising builders to look into the advantages of oil heat.

In Rochester, N. Y., for example, the local oil-heat group contributes heavily to builders' advertising and even helps to sell homes on the site. Fuel is provided free until homes are sold.

In Wilmington, Del., Humble made a unique arrangement to encourage the builder to install oil-burning equipment throughout a development. The company promised to stand behind the equipment, absolving the builder of responsibility, provided Humble supplied the oil and services (OGJ, Nov. 6, p. 80).

The use of oil heat, according to Humble studies, would save enough to pay the cost of electricity for air conditioning. Thus the builder had the potent sales pitch of a home that could be heated and cooled year

WORKMAN puts protective coating on one of 10,000-gal. fuel-oil tanks for central distribution system in Poughkeepsie Township, New York. Such a system has long been a dream of oil-heat promoters.

round for the cost of heating alone.

In Seattle, the state oil-heat group has stolen a page from the book of the gas utilities. It has given builders $100 equipment allowances for homes. And oil-heat interests there are running strong new-home promotions to support builders' sales efforts.

These are among the more outstanding examples of how oil is battling for important new-home business, but they are not the only ones.

Central oil distribution. A central distribution system, long a dream of oil heat, has been installed in a 50-home development in Poughkeepsie Township, New York. And a similar project at a 500-home development is in the works.

Oil is piped from central storage to every home in the development in a system that could be still another potent weapon in bidding for the new-home market. In this pilot project, Tri-State Pipe Lines, New York, N. Y., has perfected a system which eliminates the oil tank in each home. This reduces the cost by $75 to $100.

Tri-State installs the central storage and piping at no cost to the builder. Sinclair Refining Co. has taken a 10-year lease from Tri-State, paying royalties on a gallonage basis.

Sinclair will supply oil to all homes, read individual home meters monthly, and bill the home owner. The lease and builder's contract guarantee that home owners will never be charged more than the current market price for oil.

Key to the distribution system is a slow-flow meter, measuring to tenths of a gallon, handling firing rates as low as half a gallon an hour. It has been approved by New York and California state authorities. The system, being self contained, can be installed anywhere.

New equipment. The API has five research organizations working on special projects for improved oil-burning equipment.

In addition, equipment manufacturers themselves have made several improvements, and refiners' research efforts have recently met with considerable success.

Gulf Oil Corp. has invented a new air-aspirating oil burner which can be installed in existing gas appliances. At the Harmarville, Pa., research laboratory, the burner is operating in a clothes dryer, water heater, incinerator, air conditioner, and central heating unit, made exclusively for gas.

The air-aspirating nozzle in the burner solves the tricky problem of providing the proper air-fuel ratio for clean and efficient burning. A portable space heater, the first appliance to use the new burner, is already on the market.

Gulf is offering the invention royalty free to interested manufacturers. To date 38 have been licensed.

Humble's recently announced grid also achieves a better air-fuel mixture, cutting fuel consumption an estimated 20%. And the company has a new burner which uses ultrasonic waves to break up oil in a fine mist for more efficient burning.

As an aid in simplifying annual fuel-oil-burner tuneups, Mobil Oil Co. introduced a new burner-cleaning product. It cuts cleaning time by more than two-thirds, thus reducing servicing costs.

3. New uses for oil

Myriad new products are flowing out of laboratories as a result of increased research spending.

Probably the best examples are the innumerable petrochemicals. Although separately they may be inconsequential, together they can make a good contribution to profits.

Standard Oil Co. (N. J.) reported that during 1960, 30 new or improved petroleum products moved out of its laboratories to commercial status. These new products are aimed more at competitive advantage than at increasing total petroleum use, but they are indicative of the efforts and results.

The most dramatic development of the year was Jersey's introduction of the first practical method of injecting heavy fuel oil into blast furnaces. This is of significance to petroleum consumption world-wide.

Dozens of experiments are under way to develop a commercial fuel cell which would use petroleum, although several other fuel sources are live candidates.

The list of possible oil uses under study would run into pages. Some of them are so "blue sky" that even a sophisticated scientist cannot mention them without a trace of sheepishness. These include such ambitious undertakings as climate control changing the temperature of the earth by making the surface more reflective or absorbent), heating harbors of northern areas to keep them open year round, direct conversion of hydrocarbons to food, and wood substitutes.

Long accustomed to growth of boom proportions as a gift of the automotive age and steady displacement of coal, the industry has been accused of reacting too slowly—and sometimes not at all—to its changed situation. But the scope of current activity indicates that if petroleum is dead as a major growth industry, the word has not yet reached those whose responsibility it is to create new markets and expand old ones.

Imports program getting last touches

Some revisions are likely, but main outlines are fairly clear. It's safe to assume there will be an over-all cut in crude-import level. But that reduction could range anywhere between 40,000 and 70,000 bbl. daily.

Clyde La Motte
Washington editor

THE oil-import-control program for 1962 is almost ready for unveiling.

Right now it is undergoing final scrutiny and debate in top-level administration circles. When this is finished, a presidential proclamation will be issued, followed within a few days by new regulations from the Department of Interior.

Unless it hits snags now unseen, the program will be announced within a matter of days—certainly by the end of the month.

Because of the plan presented by Interior is still subject to change, the specific details of the final program are uncertain. It is entirely likely that some revisions will be made to pacify critics from other departments who are now giving Interior's proposals close study.

"Some negotiations between the departments are already under way and more will follow," one government official said at midweek. "There will have to be some give here and there before it is all over."

Even so, the outlines of the new program are fairly clear at this point.

Key point. The basic issue, of course, is what should be the over-all level of crude imports.

As it stands now, a reduction of from 40,000 to 70,000 bbl. daily below the current level is likely. If Interior has its way, the figure will be near the 70,000 level; if the State Department is sufficiently insistent, the cut will be nearer the lower figure.

(The reductions will apply to Districts 1-4. District 5 levels will undergo little change, if any, and the product level for all districts will be the same as in the past—the 1957 level.)

The plan for Districts 1-4, as it stands now, calls for a total based on a percentage of the domestic crude used in U. S. refineries.

The base period will be the 12 months ending 90 days before a new allocation period begins. Thus, the level for 1962 will be based on the domestic - crude - refinery input, including lease condensates, for the 12 months ending September 30, 1960.

This does not mean, however, that individual quotas will be based on individual refiner's use of domestic crude. Only the over - all level will be determined in that fashion.

The crude-input approach represents a distinct change from procedures used up to now wherein the level has been based on Bureau of Mines estimates of total demand for an upcoming allocation period.

The use of a new base will require the use of a new percentage figure, too. Heretofore, the import allowable was 9% of the total estimated demand, including products. Under the new plan, the percentage figure to be used in conjunction with the domestic-crude-input base will likely be 10.25%.

The increase in the percentage figure from 9% to 10.25% results from the narrower base to which the percentage figure is applied.

The third step necessary will be to determine the procedure by which individual allocations will be established.

Rough drafts of these new regulations have already been prepared by Interior. But adjustments will be made to obtain the over-all results called for in the final presidential proclamation.

Percentage floor. One of several decisions to be made after the presidential proclamation is issued is the exact percentage "floor" that will be provided for historic importers, who now get 70% of their base-year imports. The likelihood is that this figure will be trimmed to help achieve the over-all crude-import reduction.

Another adjustment will be in the sliding-scale method of determining quotas based on refinery runs. It is quite likely that the present nine-division scale will be reduced to three or possibly four divisions.

No other changes in the mechanics of the program are pending.

Canadian problem. It is not likely that the presidential proclamation will change the present exemption of crude-oil imports from Canada.

Instead, an effort will be made to handle this problem on an administrative basis, preferably through some form of "gentleman's agreement" with Canadian officials regarding the rate of increase of Canadian imports into the U. S.

Eventually, if it appears necessary, Interior itself may take specific steps to slow the flow from Canada.

Residual fuel. Action on another sticky import problem, the control of residual fuel, may also be delayed until later—perhaps until after the first of the year.

There is an outside possibility, however, that the Office of Emergency Planning may make a recommendation to the White House before that time.

The OEP role is to certify to the White House that a national security need exists—or does not exist—for a continuation of the present residual-fuel-control program. It has had this problem under study for some time and has come under increasing pressure of late for prompt action.

Crude-oil background. The Kennedy administration has been eying the crude - oil - import - control program almost from its first day in office, and eventual changes have long appeared inevitable.

The first move was to hold hearings on both crude-oil and residual-fuel-import controls. Then Interior officials, under the direction of Assistant Secretary John M. Kelly, began drafting plans.

Basically, the plan that eventually evolved at Interior was based on the conviction that the current con-

trol program has not produced the desired results.

"Under the program we are charged with making sure that this country has a strong domestic oil industry ready to meet emergency demands," one Interior official explained. "And it seems clear to us now that the domestic producing industry has not been able to maintain the desired pace."

Therefore, an early decision was made to reduce the flow of imports as one means of strengthening the producing segment. The next problem was how to achieve this with the least disruption to normal patterns.

It also appeared logical to Interior officials that tying the import level to domestic crude use would be more satisfactory than the old method of basing import allowables on total demand.

Opposition. The chief obstacle Interior has faced has been in convincing some other departments in the administration that such moves were essential at this time.

State, for instance, has been concerned about the impact on friendly nations, particularly Venezuela and Canada. Venezuela has made strong and repeated protests to State, emphasizing that its economy is based to a large extent on oil and that the health of its oil industry is directly related to its markets in the U. S. It has also emphasized that in past emergencies it has been a vital source of offshore oil for the U. S. and her allies.

Canada, too, is extremely concerned. It values highly the present exemption status and feels that the exemption should be continued, both for economic and security reasons on both sides of the border. Any curtailment of that status will be resented in Canada, and could have broad repercussions.

Also, there are those in the Kennedy administration who are extremely reluctant to see the oil-control program tightened. For one thing, they are aware that the administration is preparing to wage an all-out fight next year to ease trade restrictions generally. In the face of such a move, they feel that restrictive action on oil at this time would be difficult to defend.

The net result has been that the current consideration of oil-import-control changes has prompted more controversy in top governmental levels than at any time since the inception of the control program.

The decisions, in turn, will tend to shape the pattern for oil-import controls for some time to come.

Delay expected in Duffy pipeline-hookup case

Hearings are over, but Texas Railroad Commission has to clean up loose ends before deciding what to do about first test of its 1958 connection order.

THE Texas Railroad Commission probably will not rule on its important B. A. Duffy pipeline-connection case until early January.

Formal hearings in this first test case of the commission's broad June 1958 pipeline order ended November 2. But it is expected that several weeks will be needed to get completed transcripts of the hearings to the contestants and several more for the commission to receive and analyze attorney's briefs before making its decision.

The commission will decide whether Crown Central Pipe Line Co. must extend its system to connect 19 Duffy wells in the Sojourner-Burson area of Haskell County. The wells are from 1 to 2 miles from the pipeline's Teague receiving station (OGJ, Oct. 2, p. 114 and Nov. 6, p. 82).

It has instructed counsel for Duffy to submit a written brief for the complainant within a week after the hearing transcript is completed. Crown Central then will have 2 weeks in which to file a reply brief.

Vital to independent. In a closing argument for Duffy, John Davenport—also attorney for the Texas Independent Producers and Royalty Owners Association—declared that Duffy had proved an "air-tight, prima facie case" under the commission's 1958 pipeline order.

Davenport said all three requirements of that order were met because Duffy had proved that:

1. **The pipeline carrier** has the ability to transport the oil.
2. **A market exists** for the crude.
3. **The period required** to return the investment would be reasonable.

"There is no more important case before the commission today than the one we have under study here," Davenport said.

Crown Central, Davenport argued, has repeatedly tried to get someone else to build the system. If the pipeline were successful in getting a third party to build it, "then that third party would be an effective buffer and would relieve Crown Central of its duties of purchasing, pipelining, or otherwise transporting this crude."

Line argues economics. Witnesses for Crown Central questioned reserve figures and line-payout estimates submitted by Duffy, and based their case on grounds that a gathering system to connect Duffy wells would not offer a reasonable payout.

Testifying for Crown Central, two expert witnesses—James E. Glover and George S. Monkhouse of James A. Lewis Engineering, Inc., Dallas—estimated recoverable reserves under the Duffy leases at 1,024,600 bbl. primary plus 1,518,400 available from water flooding.

Using the Monkhouse figures, J. G. Spicer, Jr., assistant treasurer for Crown Central, testified it would require a gathering charge of 16.028 cents a barrel for his company to break even if it built the line.

Raybourne Thompson, Houston attorney for Crown Central, said his client was willing to lay a gathering system and charge the producers 10 cents a barrel until the actual costs of construction were recovered. Then, he said, the charge would expire—but Crown Central would prefer that Duffy or someone else build the system on the same terms.

It wouldn't be right, Thompson argued, for the commission to require someone to build facilities based on cost and reserve estimates of a complainant.

Water separation hindered

Surfactants add to jet-fuel problems

D. H. Stormont
Refining editor

JET-FUEL suppliers are finding they must deal with a third contaminant if they are to insure that only clean, dry fuel is delivered into civilian and military jets.

The harmful effects of particulate matter and free water have been known for several years. Only in the past year, however, have surfactants been classed as bad actors. Evidence is mounting that their presence can lead to fuel gage malfunctions, plugged filters, and aggravate microbacterial induced problems.

Every day hundreds of thousands of barrels of jet fuels are stored, fueled into aircraft, and consumed without any problems. Once in a while, though, operational difficulties arise with fuels—principally the kerosine type—which met all specifications and were properly filtered when loaded.

Representatives of several major oil companies, airlines, and government agencies recently met with Department of Defense officials at a 2-day meeting in Washington to discuss the jet-fuel contamination problem. Highlights of the several papers dealing with surfactants are given here.

Attention also was given to dirt, water, and microbiological contamination (OGJ, July 3, p. 82).

An understanding of how surfactants (short for surface active agents) function helps explain many of these difficulties.

Most of these materials are water soluble and thus tend to accumulate in any free water present in the fuel or condensing from it. Further, they tend to migrate to the fuel-water interface where they lessen the interfacial tension between the fuel and water. Principal adverse results are:

Finer water emulsions. The low interfacial tension stabilizes the droplets against coalescence by collusion; their small size prevents them from settling.

The resulting difficult-to-break emulsions contribute to such problems as pools of water in aircraft fuel tanks and growth of microorganisms. Water and bacteria together produce a situation which can result in corrosion.

Lower filter efficiency. During filtration of a fuel containing even trace amounts of surfactants, these materials can coat the coalescer elements and render them relatively ineffective as water coalescers. Free water and dirt in unknown quantities thus can be pumped into the aircraft tanks.

Partial coalescence on the downstream side of the filter-separator results in a soapy, gelatinous, watery material generally called "surfactant slime." Depending on the exact materials formed by the surface active agent, the filter element itself may become completely blocked by the slime.

Surfactants which are readily water extractable are more troublesome than largely oil-soluble compounds such as rust inhibitors. Reason for this is that a relatively small amount of water—as is apt to be the case in an essentially dry fuel-handling system—tends to concentrate the surfactants. These concentrated water solutions in turn affect the coalescing and separation efficiency of the filter-separators.

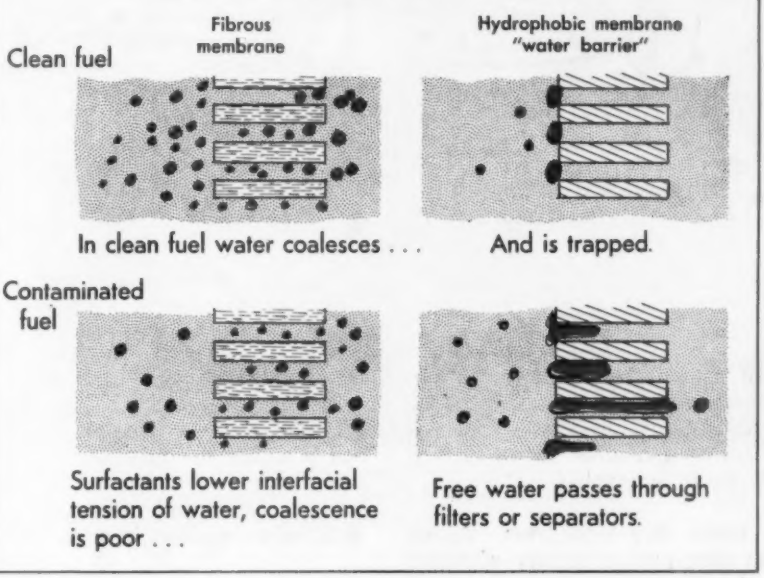
The marked reduction in the life of filter-coalescer cartridges which can result from very small concentrations of surfactants was clearly brought out in data presented by J. A. Bert of California Research Corp.

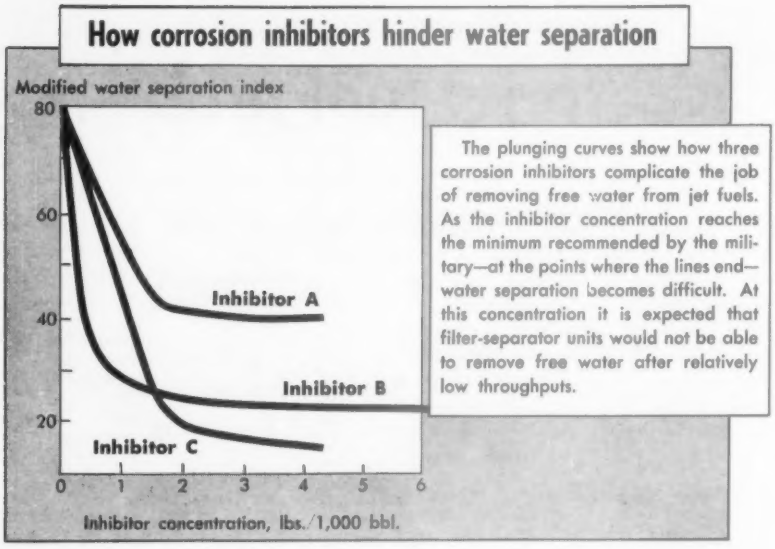
At one airport it was found that cartridges from a 400-gal.-per-minute filter began to pass water after only some 400,000 to 600,000 gal. of fuel had been filtered. Investigation showed that concentrations of sodium sulfonate as low as 0.5 p.p.m. in the fuel could result in the filter failing to remove water properly in less than one-fifth the normal cartridge life.

Changes in refinery processing procedures reduced the concentration of sodium sulfonate to between 0.05 and 0.1 p.p.m. Field tests with this fuel showed the life of separator units had been increased to more than 2.5 million gallons throughput. There was also a noticeable reduction in the particulate matter in the fuel.

Although Cal Research's expe-

What surfactants do in jet fuel


Fibrous membrane
Hydrophobic membrane "water barrier"
Clean fuel
In clean fuel water coalesces . . .
And is trapped.
Contaminated fuel
Surfactants lower interfacial tension of water, coalescence is poor . . .
Free water passes through filters or separators.


How corrosion inhibitors hinder water separation
Modified water separation index
80
60
40
20
0
1
2
3
4
5
6
Inhibitor A
Inhibitor B
Inhibitor C
Inhibitor concentration, lbs./1,000 bbl.
The plunging curves show how three corrosion inhibitors complicate the job of removing free water from jet fuels. As the inhibitor concentration reaches the minimum recommended by the military—at the points where the lines end—water separation becomes difficult. At this concentration it is expected that filter-separator units would not be able to remove free water after relatively low throughputs.

rience was principally with sodium sulfonates, other surfactants probably give somewhat similar results. Effect of three military-approved corrosion inhibitors for jet fuels is shown in the graph.

Where they come from. During the past year a number of major fuel suppliers have been investigating the contaminant problem.

Shell Oil Co.'s D. N. Harris and L. P. Haxby said the surfactants can originate as residual treating materials, from naturally occurring materials not entirely removed during refining processes, or as oxidation products of materials contained in the fuel. In addition, chemical cleaning compounds, most of which are surfactants, are not always entirely washed from lines and equipment before they are restored to service.

Most of the processes commonly used to treat jet fuels can produce surface active byproducts. Acid treating can leave aromatic sulfonic acids in the fuel, copper treating can result in some sulfonates, and solutizer treated fuels can contain sulfonates and naphthenates. Doctor treating can lead to water soluble sodium sulfonates, naphthenic acids, and phenols.

Another potential source are rust inhibitors, dispersants, antioxidants, and antiicing compounds commonly added to gasolines and other distillates. Almost all have surface active properties to some extent. Unless extreme caution is used in shipping and storage operations, some of these additives can be picked up by the turbine fuel.

Whether the refinery is a constant source of surfactant contamination, and pipelines and fuel-handling facilities only minor contributors, are yet to be determined. Quite possibly both are contributors in most cases.

What's being done. As pointed out by W. G. Dukek of Esso Research, surfactants are only one part of the problem; they shouldn't be singled out as the primary offender. In most cases, he believes, attention to the safeguards against delivering solids or free water into aircraft would make the possible presence of surfactants a matter of academic interest only.

Surfactant contamination usually is detected only after it has occurred, through observations such as:

1. **Excess quantities** of dirt or free water being delivered into aircraft.
2. **Discovery of slime** in fuel distribution systems, tanks and filters.
3. **Rapid plugging** or malfunction of filter-separators.
4. **Effective settling** is not being obtained in storage tanks.

Two laboratory techniques have been developed which can be used to detect surfactant contamination. One is the water "Separometer" test developed under the auspices of the Coordinating Research Council. The other, known as the "kerosine surfactant test," was developed by Shell Oil Co.

Both evaluate fuels by utilizing the coalescing principle. Neither, however, identifies the type of surfactant. Thus, it usually is necessary to determine the type of surfactant to apply proper corrective measures.

Although not a commercially recognized test, the "white bucket" test offers a reliable field method of detecting the presence of slime. It is particularly applicable to water drained from storage tanks, from filter-separators, and refueler trucks. A visual method, it offers a rapid method of slime detection if results are interpreted properly.

Efforts are being made to develop a relatively simple test for checking the fuel at the point of use. One possibility is to adapt a treated water-repellent paper of the type used in filter-separators. Main difficulty is the large amount of fuel which must be handled to measure the effects of a few parts per million of surfactants.

Both suppliers and airports are tightening up on fuel-handling practices. At airports, the policy of "settling plus double filtration after the fuel was last exposed to bare iron surfaces" is being followed more closely. Also more attention is given to pressure buildup in the filter, and to other evidences of surfactant slime.

Where it is suspected that a system is contaminated, remedial steps undertaken include:

Frequent change of coalescer elements in the filter-separators, including washing of the internal surfaces of the filter with water to remove any slime.

Decontamination of tanks and lines by water washing.

Prolonging settling time in tanks to help remove slime and prevent it from traveling further downstream.

Refinery contamination. Elimination of surfactant contaminants at the refinery is also receiving more attention. This includes closer supervision of shipping practices and more frequent inspections of tankage, as well as review of practices used for removing surfactants resulting from treating.

Cleaning up a fuel at the refinery doesn't assure surfactants will not be added during shipment, but it should make for fewer surfactant problems at the airports.

Pan Am unveils steel "casing patch"

New way of making down-hole repairs is cheap, simple.

A NEW technique for making cheap down-hole casing repairs with steel patches has been developed by Pan American Petroleum Corp.

The company says the patching technique, which employs a corrugated steel liner, promises to be much faster and more economical than conventional casing-repair methods.

Besides sealing holes and splits, the technique also may be effective in repairing parted casing in place.

Pan Am has carried out several field tests.

In one test, a casing leak at 1,700 feet was repaired in 5½ hours. In another, the tool was made up, patch set at 2,000 ft., the repair tested, and cleaning up was under way in 3½ hours.

Two items are involved in the technique: a placement tool, and a glass-fabric-wrapped section of ⅛-in. steel tubing coated with unset plastic.

This tubing, or liner, has an outside diameter slightly larger than the inside diameter of the casing to be repaired. Through a special corrugating method, the diameter of the liner is reduced so the liner will run down the casing.

Placement tool and liner are lowered on tubing and centered over the damaged area. Then, by hydraulic pressure, a die is pulled through the liner to expand it. This locks the liner in place under compressive stress.

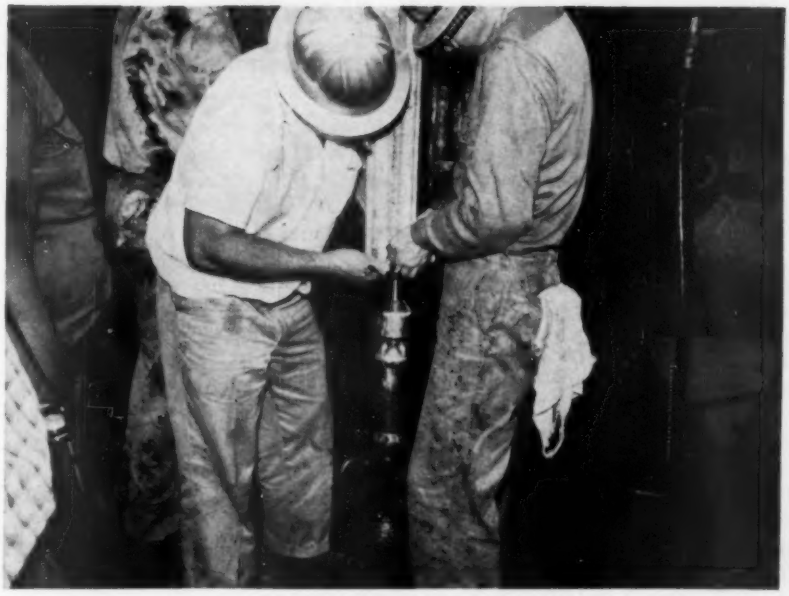
The glass fabric and plastic form a permanent, high-strength seal between liner and casing.

When the Pan Am technique—officially called "stressed-steel liner for casing repair"—is used, there is no significant reduction in the internal diameter of the casing.

Nor is there any interference with well operation, including drilling.

One big advantage of the procedure: well operation can be resumed as soon as testing is finished.

Additional liners can be placed above or below earlier repairs.



LENGTH of corrugated steel tubing, wrapped with glass fabric, is put atop placement tool during casing-repair job in the East Texas field. Fabric will be coated with plastic cement before unit goes down the hole.

Licensees. Pan Am has licensed the steel casing patch to three service companies: Davis-Kemp Tool Co., Inc., Kilgore, Tex.; Halliburton Co., Duncan, Okla.; Houston Oil Field Material Co., Houston.

Both liner and placement tool had to be designed and fabricated by Pan Am in order to get the technique shaped up.

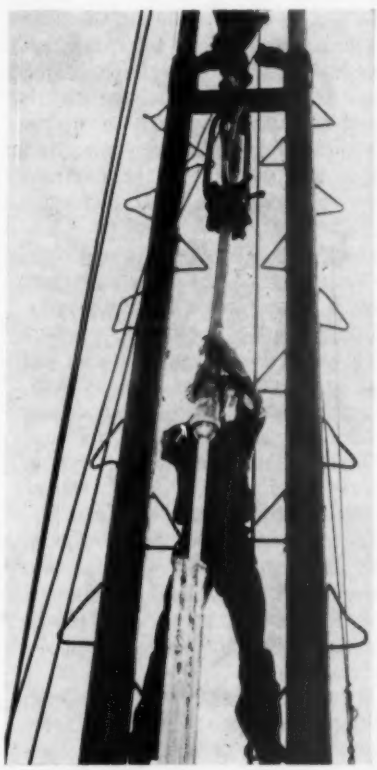
Because the company couldn't find a steel mill with the kind of equipment needed to process steel tubing to specifications, Pan Am engineers designed and built prototype equipment.

These designs were given to a fabricating firm, and arrangements were made for the fabricator to supply liners to the licensed service companies.

The liner was developed specifically to repair damaged casing in old wells. Pan Am figures this will be its greatest application.

However, the technique may also be used in the drilling of new wells.

Citing the low cost and simplicity of the method, plus reduction of rig time and down time on the well, Pan Am says the steel-patch method ultimately may replace conventional ways of repairing most down-hole casing damage.



FINAL step in making up repair unit is placement of tubing connector and retainer on top of steel "patching" liner. Assembled unit is lowered to run on the tubing.

Gulftane to spread; Humble to try new

Gulf tells its distributors Gulftane will be marketed "nation wide." Humble will drop superpremium for a new gasoline between regular and premium.

GULF AND HUMBLE are making important moves toward dumping their superpremium gasolines, but the substitutes they offer are sharply different.

Gulf Oil Corp. is preparing to go regional, and probably national, with its new test-marketed Gulftane, a subregular priced to compete with the independents. It replaces Gulf's superpremium.

Humble Oil & Refining Co. announced last weekend it will introduce a middle-grade gasoline in Texas and in two eastern test markets and eliminate its superpremium. In the place of Golden Esso will be Enco Plus in Texas and Esso Plus in the Pittsburgh and Norfolk-Newport News metropolitan areas. In quality and price, "Plus" gasolines will fall between regular and premium gasolines.

Thus, two of the nation's biggest gasoline retailers are admitting that the big market for the high octane superpremium simply hasn't developed as expected. And they intend to cash in on business generated by most of the nation's automobiles, including compacts and foreign cars.

Gulftane. Gulf's move will create the bigger stir. By test marketing in San Antonio, Indianapolis, Buffalo, and the Norfolk-Newport News area, the company already has helped generate price wars by competing directly with independents who have been gobbling up huge chunks of the gasoline market in recent years.

The company had not formally announced its plans last week, but the Journal learned that an announcement is pending. The changeover will come in all, or part, of Texas momentarily and possibly in other areas.

However, distributors have been told that this is a nationwide program, at least for stations now carrying Crest. Stations which market only two grades—the regular Gulf and the premium No-Nox—may be delayed in adding Gulftane. Actually, it would take months for Gulf to make the switch throughout its 39-state marketing area, where it has 36,000 outlets. Making refining and distribution arrangements will require time. In some areas, too, the company may decide that the superpremium Crest is worth keeping, but, by and large, Gulf has decided to go the Gulftane route.

While Gulf officials are not yet discussing their Gulftane decision publicly, they are known to hold the view that a majority of the cars on the road today can operate on gasolines of subregular octane rating, while only a tiny percentage of the cars need a superpremium. And even the high-horsepower cars can get along on premium gasoline with additives.

Service-station operators in Corpus Christi, Houston, and East Texas cities were reported last week changing their Crest signs to Gulftane, and competing marketers were girding for a price war.

If the pattern set in the Gulftane test cities is followed, prices will fluctuate wildly. Each Gulf dealer will meet the price of his closest independent competitor with Gulftane. There also may be a tendency to close the usual 2-cent gap between subregular and regular to 1 cent. And some competing majors may cut their regular prices to the Gulftane level.

Humble's Plus. The new middle-grade Humble gasoline will go on the market before the end of the month.

The company expects Enco Plus and Esso Plus to catch the owners of compacts and other new cars which don't get top performance from regular gasoline but don't need premium.

"This new product between premium and regular in both quality and price will be of real benefit to our gasoline customers because it effectively gives the customer the products he needs at the prices he wants to pay," Marketing Vice President **W. W. Bryan** said in Houston last week.

"This program will be merchandised in various ways in the different test markets to determine the best way to present the new three grade systems to the motoring public."

Humble did not say specifically what its price for "Plus" gasoline will be. Last week in Houston there was a 4-cent spread between Enco regular and Enco Extra. And presumably Enco Plus will split the difference.

Whether Humble will engage Gulf in a price battle for the subregular market, the company did not say. Humble made clear, however, it will not market a subregular gasoline such as Gulftane—and it referred to its competitor by name.

The question is whether Humble, or any other major for that matter, will match the Gulftane price with its regular gasoline.

Who wins? While Texas will soon become a full-blown battle area for gasoline marketers, Norfolk - Newport News may serve as even a bet-

Pipeline briefs

Revenues of interstate natural-gas pipelines continue to rise faster than sales. Revenues in August were $274,803,389 against $255,-891,163 for August 1960, an increase of 7.4%. Sales in August were 710.3 billion cubic feet against 696.6 billion cubic feet in the same month of last year, an increase of 1.97%. Sales in August 1961 included 140.4 billion cubic feet to ultimate consumers, down 7.5%, and 569.9 billion cubic feet for resale, up 4.6%. Net income was up 6.8% to $21,630,235.

Field facilities costing $6,514,500 are planned by Arkansas Louisiana Gas Co. for 1962. Arkla has asked FPC for a budget-type permit covering this amount with no single expenditure to exceed $500,000.

middle grade

ter sounding board for marketers who want to know which way to jump in today's struggle for the motorists' dollars.

Humble picked this area for one of its two Esso territory tests, knowing full well that Gulf had done the same thing last August with Gulftane (OGJ, Aug. 28, p. 54). Further, Sun Oil Co. has put its nine-grade Sunoco pump into the Norfolk-Newport News area. Thus three companies are wooing the motorist with almost any combination he wants.

So far, Gulf has been close-mouthed about the success of Gulftane in its four test markets, but obviously volumes have risen sufficiently to justify the expansion now anticipated. Estimates of the volume increase have ranged between 15 and 20%. But the revenue increase would be considerably lower because of the price wars.

Whatever the outcome, retail gasoline marketing will be a lively business in the months ahead.

Kyso breaks ground for new refinery

STANDARD Oil Co. (Ky.) has broken ground and is clearing a 2,700-acre site for its new 100,000-bbl.-daily refinery near Pascagoula, Miss.

The Standard Oil Co. (Calif.) affiliate plans to complete the plant in 1963. It will include an 18,000-bbl.-daily Isocracker.

Fluor Corp. reportedly has the contract for the major portion of the project—biggest domestic construction job since Tidewater Oil Co.'s 130,000-bbl. Delaware City refinery was completed in 1957. Two other contracts may be announced soon.

Work will begin soon on improving a 7-mile channel from the Gulf of Mexico to the Bayou Cassotte area where the plant will be located. The channel will handle tankers up to 33,000 tons.

The refinery will be tied into the Plantation products pipeline, which runs from Louisiana to the Carolinas with a lateral into Tennessee. Kyso owns part interest in Plantation.

Crude supplies will come from offshore and onshore Louisiana fields operated by the California Co., a Standard of California subsidiary.

Cal-Ky Pipeline Co., a new Kyso subsidiary, will build a 104-mile crude line from Ostrica, La., to the refinery.

Northeast B. C. crude finally breaks into big Vancouver market

PURCHASE of 7,000 bbl. daily of northeastern British Columbia crude for its IOCO refinery, near Vancouver, will be made by Imperial Oil Ltd.

Imperial and other refiners in the 75,000 - bbl. - daily market, now served entirely by Alberta crude, have agreed in principle to take B. C. crude when it becomes available at competitive prices. They did so at the prodding of the B. C. government, which has been dissatisfied with the pace of oil development in the province.

Crude will be delivered through the Wstern Pacific Products and Crude Oil Pipelines, Ltd., 12-in. line from Taylor Flats to Kamloops, B. C., and from there to Vancouver via Trans Mountain Oil Pipe Line. The 12-in. line is almost finished.

Northeastern B. C. fields are producing 2,000 to 3,000 bbl. daily for processing at a refinery at Taylor Flats. Most of it comes from Boundary Lake, Milligan Creek, and Blueberry fields. A heavy drilling program now under way is expected to raise output to 24,000 bbl. daily by early next year.

The facilities would enable the company to increase the intake of its present pipeline system.

Contract for construction of a 30-mile 8-in. line from Wichita Falls, Tex., to Temple, Okla., has been let to Williams Bros. by Cherokee Pipeline Co. The line will cross the Red River. Work began last week.

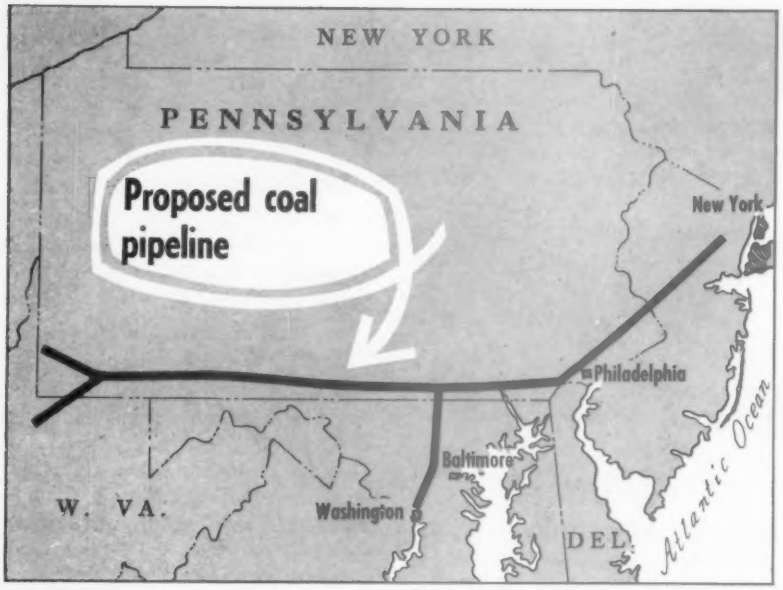
A budget-type program for United Gas Pipe Line Co. construction has been approved by FPC. United can spend up to $3 million during 1962 on natural - gas - pipeline facilities, with no single project to cost less than $400,000. The facilities would be built as needed to reach new supplies of natural gas.

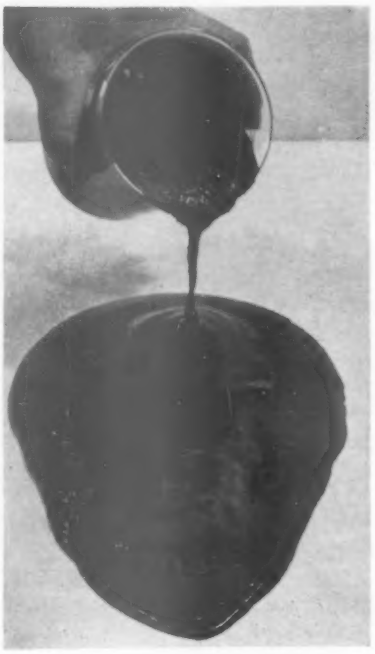
Approval to construct $2,722,400 worth of facilities has been granted United Gas Pipe Line Co. by FPC. Major single project will be 10.2 miles of 30-in. loop in Terrebonne and Assumption parishes, Louisiana. It will enable United to take increased gas from the Turtle Bayou area where reserves have increased from 692.8 to 1,954.8 billion cubic feet and deliverability from 100 to about 352 million cubic feet per day.

Tennessee Gas Transmission is asking FPC for authority to spend $56 million to increase capacity of its main line to 2.9 billion cubic feet of gas daily. Expansion would involve construction of 210 miles of large diameter line and 87,700 additional compressor horsepower. Included would be 76 miles of 36-in. and 76 miles of 30-in. loops and a 58-mile, 20-in. gathering line to serve the Ship Shoal area off Louisiana. Companion application has been filed by Midwestern Gas Transmission, TGT subsidiary, asking authority to buy an extra 15 million cubic feet of gas daily from the parent company in the Chicago area.

Construction applications have been filed with the FPC by El Paso Natural Gas for $5 million, and by Panhandle Eastern Pipe Line for $2.5 million. Both cover 12-month periods and neither contains single projects costing more than $500,000.

A 20.5-mile 24-in. line of United Gas Pipe Line Co. will cross the Florida-Alabama border. It is being laid by C. S. Lenoir Construction Co. and will consist of 17 miles in Baldwin County, Alabama, and 3.5 miles in Escambia County, Florida.





COAL PIPELINE from mining states to East Coast electric-power plants will carry 60-40 slurry, which settles out to 70-30 mixture (right) in storage. Special furnace burns 70-30 slurry without expensive dewatering treatment.

Advent of big coal pipeline nearer

THE much-discussed era of large-scale coal pipelining has been brought a giant step closer.

Two years ago a 20 to 30-in. coal slurry pipeline from western Pennsylvania and northern West Virginia to East Coast power plants was proposed by Texas Eastern Transmission Corp. and Consolidation Coal Co. Last week the companies disclosed technical advances in the infant science which alter the economics of the $100-million project from "attractive" to "compelling."

A pipeline, according to Texas Eastern and Consol, could reduce the cost of transporting coal to as little as one-half the present rail rate. They predict the project will be started in 1963 and completed in 1964.

The technical advances:

A stable slurry of 60% coal and 40% water achieved by the proper-size distribution of coal particles. This compares with a less economic 50-50 slurry which is being pumped through Consol's pioneer Cadiz, Ohio-Cleveland coal line completed in February 1957.

Direct firing of a 70-30 slurry in a boiler furnace without expensive dewatering or thermal drying as is done on the Cadiz-Cleveland project. The pipeline slurry settles out in storage to a uniform 70-30 mixture, permitting removal of 25% of the water by simple decanting to produce the furnace charge.

Test operations. The direct-firing method, developed by Babcock & Wilcox Co., boiler manufacturers, was shown on a commercial scale last week at the South Amboy, N. J., plant of Jersey Central Power & Light Co.

Interested spectators included 30 potential customers, mainly electric utilities, and observers from as far away as the West Coast.

The slurry is sprayed into a furnace where the water is vaporized by an air cyclone at 700° F. The hot air also ignites the coal particles. Vapor goes up a stack.

The slurry burned at South Amboy was prepared at Cadiz, then shipped as a 60-40 mixture through Consol's 108-mile 10-in. line to Cleveland. There it was decanted to a 70-30 ratio for barging via the lake-canal-river system to New Jersey.

Proposed pipeline. Texas Eastern and Consol propose a joint project to carry coal from West Virginia and Pennsylvania mines to power plants on the East Coast from Washington to New York.

Lateral lines will be laid from the main line to customer plants which agree to purchase coal under long-term contracts. In addition to supplying big power plants, the companies say smaller industries could be served by truck or rail from pipeline terminals in the same manner that refined products are distributed.

The pipeline will deliver between 6,000,000 and 10,000,000 tons of coal annually, the lower figure being the minimum volume that would support a 20-in. pipeline. This compares with a capacity of 1,250,000 tons for the 10-in. Cadiz-Cleveland line.

Texas Eastern says several of the utilities which sent observers to the tests are in a position to take 1,000,000 tons each. Some have expressed an interest in this means of cutting costs, but no one has signed the necessary long-term contract. This will be the next step in pushing the project.

The coal line will presumably come under the jurisdiction of the Interstate Commerce Commission, with which it would file a rate schedule. However, no permit will be needed to build the line.

The pipeline company expects to purchase the coal for the line and

then sell it at the other end to the customer.

Coal pipeline era? Backers of the line predict it will be but the first of many large-diameter coal-slurry lines connecting vast coal reserves with major utility markets.

They cite the success of the original Consol line, which is best remembered for its spectacular failure in starting up in February 1957. When malfunction of screening equipment resulted in oversize particles which settled out on grades, the clogged line had to be cut in several places and cleaned out.

Since then, however, the line has delivered 5,000,000 tons of coal without mishap. Last year it was kept on stream 97½% of the time. Even with its relatively small diameter and volume, it still beat rail-freight rates considerably. The new slurry developments will improve coal-pipeline economics still more.

For Texas Eastern, an integrated oil company as well as an operator of oil products and gas pipelines, this represents further diversification as a pipeline transporter of energy, whatever its form.

For Consolidation Coal and other coal suppliers, pipelining appears to offer a badly needed opportunity to improve on rail costs which have priced their mineral out of several markets.

Freight amounts to roughly half the delivered price of coal in the New York area. By cutting freight 50% with the pipeline, the delivered price would be reduced 25%. A 3% loss of boiler efficiency from firing a slurry rather than dry coal would lower the advantage to 22%.

This improvement would be a strong weapon for recouping some of coal's lost business, or at least for protecting present markets against further inroads by heavy fuel oil and natural gas.

The utilities could achieve a major reduction in the cost of their fuel and original investment. Babcock & Wilcox estimates that by burning a slurry instead of dry coal, a power plant would save 5 to 7% of total investment, or $3,500,000 in a typical 500,000-kw. generating station. This would be achieved through eliminating coal-handling equipment such as barges, docks, conveyors, railroad sidings, bunkers, and pulverizers.

WATCHING WASHINGTON

with Clyde La Motte

Swidler will reveal his regulatory philosophy at API

WHEN Chairman Joseph C. Swidler speaks at the API meeting in Chicago this week he will spell out his basic philosophy on the Federal Power Commission's regulatory role as it affects producers.

This will go a step beyond Swidler's previous public statements in which he largely limited himself to indicating his initial position on specific aspects of specific problems. The Chicago speech will, in effect, be the general "platform" on which he hopes to base FPC action.

Swidler will also emphasize the need for industry cooperation to help the commission cope with regulatory problems. He and the other new commissioners are rapidly becoming aware that a great deal of coping is going to be necessary, and they would like to enlist all the help they can.

Off-again, on-again gas visit by Russians is off again

THE planned visit of a Russian delegation of natural-gas experts to this country has been postponed again—this time until next spring.

The Russians were to have started their tour this week after a scheduled arrival in New York during the weekend. However, in the middle of last week they were asked by the State Department to delay the trip.

It is understood that State's action was influenced by several members of the American Gas Association who felt that the Berlin crisis and soviet nuclear bomb testing did not provide a proper climate for a visit at this time. (AGA was to have acted as host for the visiting delegation.)

The current switch in signals by the U. S. is similar to the last-minute Russian decision earlier this year to delay a visit that was to have preceded the trip a U. S. delegation made to Russia.

Interior launches special study of Mineral Leasing Act

INTERIOR is giving the Mineral Leasing Act a close look, particularly as to whether to recommend that competitive bidding be required on wildcat leasing.

An intradepartment subcommittee has been appointed to study the issue and make a report. At that time, Interior will probably hold a series of informal meetings with interested trade associations and other groups to get their views.

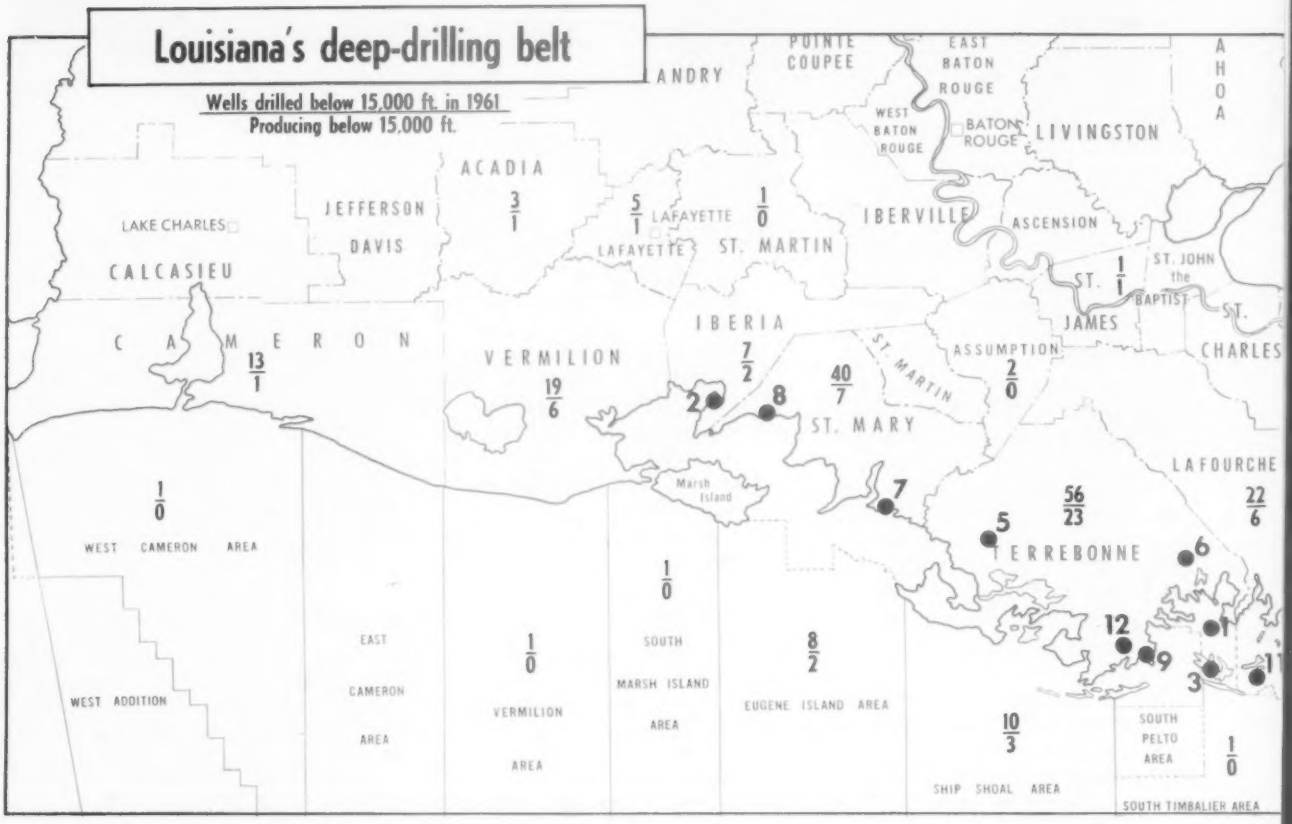
The move stems from remarks made by John M. Kelly, Assistant Secretary of Interior for minerals, during a speech recently at Roswell, N. M. Kelly suggested that a revision might be desirable. His speech stirred considerable comment, both pro and con, and led to a decision to make a special study before deciding whether to ask Congress for legislation.

Pressure grows for dumping residual fuel controls

DON'T count out the possibility that residual-fuel import controls may be abandoned in the months ahead.

The administration has been under an increasing bombardment from several points, including New England industrialists and independent residual-fuel-oil terminal operators, to get the program eliminated or sharply revised.

Interior and independent producer groups are lukewarm at best for continuatiton, leaving coal spokesmen as the only strong advocates for keeping the lid on resid.



Deep-drilling activity hits a new high

Neil Williams
Associate Editor

SOUTH Louisiana is setting new records this year in volume of deep drilling.

With nearly 2 months to go, the number of wells drilled this year to depths below 15,000 ft. already has passed the total for any previous year in South Louisiana.

The increase comes despite a small decline in over-all drilling in the district. And at a time when the average depth of wells in the U. S. is getting shallower.

This year's tally shows 186 wells already drilled to depths below 15,000 ft.

Twenty-one additional wells now drilling below that depth raise the total to 207. Forty-nine others are drilling with projected depths to those levels.

Previous top year was 1960 with a total of 192 wells drilled past 15,000 ft.

Wells with depths below 15,000 ft. represent slightly more than 10% of total completions for the district so far this year. Only 8% of 1960's completions were in that depth bracket.

Included in this year's 15,000-ft.-plus wells are 84 which have gone below 16,000 ft. And 24 of these went below 17,000 ft., 7 below 18,000 ft., 2 below 19,000 ft., and 1 below 20,000 ft. Thirteen of those still drilling are at depths below 16,000 ft. with 2 of these below 17,000 ft.

Many more of South Louisiana's more than 285 currently drilling wells are at, or projected to, depths just short of 15,000-ft. Drilling to 12,000-ft., 13,000-ft., and 14,000-ft. depths has become more than common in this district.

This year's completed deep wells are spread over more than 100 separate fields, 13 parishes and 9 offshore areas. Current drilling wells below 15,000 ft. are in 19 different fields and areas in 5 parishes and 2 offshore areas. Greatest concentration of ultra-deep drilling is in St. Mary Parish, where 8 wells now are drilling below 15,000 ft.

No new depth records. The greatest depth drilled in any well so far this year has been 20,598 ft. This lacks 1,972 ft. of equaling South Louisiana's — and for a time the world's—record depth of 22,570 ft. drilled in 1956 in Richardson & Bass' well in the Lake Washington area in the delta country below New Orleans.

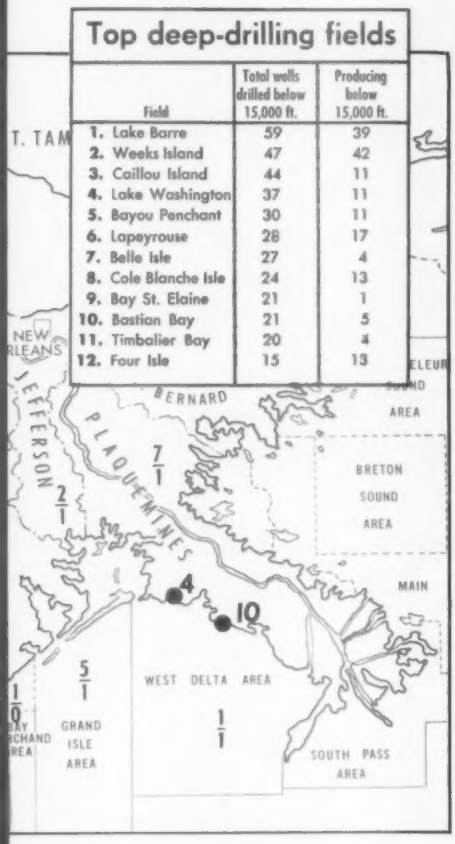
This year's additions raise to more than 1,100 the total number of wells in South Louisiana that have been drilled below 15,000 ft. It is the greatest array of ultra-deep drilling to be found in any of the world's many oil and gas provinces.

Of the total, 460 have been drilled below 16,000 ft., with 148 going below 17,000 ft., 36 below 18,000 ft., 9 below 19,000 ft., and 6 below 20,000 ft.

All have been drilled in the 14

Top deep-drilling fields

Field	Total wells drilled below 15,000 ft.	Producing below 15,000 ft.
1. Lake Barre	59	39
2. Weeks Island	47	42
3. Caillou Island	44	11
4. Lake Washington	37	11
5. Bayou Penchant	30	11
6. Lapeyrouse	28	17
7. Belle Isle	27	4
8. Cole Blanche Isle	24	13
9. Bay St. Elaine	21	1
10. Bastian Bay	21	5
11. Timbalier Bay	20	4
12. Four Isle	15	13



in Louisiana

years since 1947, when the first well to reach 15,000 ft. was completed. The first 16,000-ft. well was completed in 1950. A year later drilling was extended to 17,000 ft., and in 1952 to 18,000 ft. More than 1,000 of the wells below 15,000 ft. have been drilled within the last 6 years.

Fifty-six of this year's deep wells have been completed with commercial production in sands below 15,000 ft. They have been in 27 different areas in 10 parishes and 4 offshore areas. Fifteen of them were productive at depths below 16,000 ft. in 8 fields with 4 in 17,000-ft. sands in 2 fields. In 8 fields, it was the first production at those depths.

Altogether, 268 wells have been productive from sands below 15,000 ft. The include 64 wells productive in 16,000-ft. sands, 18 in 17,000-ft. sands, 1 in a 19,150-ft. sand, and 1 in sands below 20,000 ft.

The latter, Richardson & Bass' well, produced originally from a sand at 21,419-65 ft. In 1957, it was worked over and recompleted at 20,741-45 ft. It still is rated as the world's deepest production.

Fifty onshore fields in 12 parishes and 7 offshore fields now have production in 15,000-ft. or deeper sands. Eighteen of these have production from 16,000-ft. sands, and 5 from 17,000-ft. sands. Currently the only production at depths greater than the 17,000-ft. sands is that in the 20,700-ft. pay of the world's record holder. Many of these fields have production from various sands in two or more of these depth classifications.

Deep production. Greatest local development of these deeper productive horizons has been in the Weeks Island field, of Iberia Parish, and Caillou Island field, of Terrebonne Parish. Weeks Island has 43 wells below 15,000 ft. with 13 at 16,000-ft. depths, and 9 in 17,000-ft. sands. Caillou Island follows closely with 39 such wells with 15 being in 16,000-ft. sands, and 5 in sands below 17,000 ft.

Terrebonne leads by far all other parishes in extent of deep sand development with a current total of 103 wells productive from sands below 15,000 ft. in 14 fields. Next in order are Iberia Parish with 46 wells in 3 fields; St. Mary Parish with 27 wells in 5 fields; Plaquemines Parish with 18 wells in 3 fields; Vermilion Parish with 17 wells in 7 fields.

Based on total depths, this year's wells below 15,000 ft. have drilled a total of 3,143,485 ft. of hole. Of this 1,635,627 ft. has been in the 15,000-ft. wells; 1,011,847 ft. in the 16,000-ft. wells; 365,130 ft. in 17,000-ft. wells; 91,291 ft. in 18,000-ft. wells; and 39,595 ft. in wells below 19,000 ft. They boost the total footage of all wells drilled below that depth to 22,567,751 ft.

How deep drilling has picked up in Louisiana

ONSHORE

Year—	Below 20,000 ft.	19,000 ft.	18,000 ft.	17,000 ft.	16,000 ft.	15,000 ft.	Total wells drilled	producing below 15,000 ft.
1953 and earlier			2	2	6	15	25	7
1954				4	6	7	17	8
1955			1	8	16	21	46	11
1956	1		2	13	34	81	131	24
1957	1	1	2	7	44	66	121	20
1958			6	14	29	91	140	30
1959	1		4	18	49	98	170	47
1960	2		4	28	37	95	166	54
1961*	1	1	4	15	56	101	178	49
Total	6	2	25	109	277	575	994	250

OFFSHORE

1955						2	2	0
1956					10	9	19	0
1957			1		2	9	12	1
1958					3	4	7	1
1959				1	8	5	14	3
1960		1			8	17	26	6
1961*			1	2	4	22	29	7
Total	0	1	2	3	35	68	109	18
GRAND TOTAL	6	3	27	112	312	643	1,103	268

*10 months.

Start on Cherokee line due

CHEROKEE Pipe Line Co. has disclosed new details of its proposed 127-mile products line from Oklahoma City to Wichita Falls. The 8-in. line will cost $2.6 million.

Work will start this month and be completed early in January. Initial capacity will be 20,000 bbl. daily to Wichita Falls.

The line will connect at Oklahoma City with Cherokee's existing system originating at Ponca City and extending to Wood River, Ill. At Wichita Falls the line will connect with Continental Oil Co.'s products line to Grapevine, near Dallas.

Cherokee is owned jointly by Continental and Cities Service Pipe Line Co.

GETTING a front-line report on market conditions is Socony's chairman, Albert L. Nickerson, at the Las Vegas meeting. In the left photo, he listens to Ted C. Boren, a Mobil dealer in Arcadia, Calif., and in the right photo to Raymond D. Rachofsky, a Denver jobber.

Mobil likes its dealer conventions

Company gets to tell its story to the men who sell its products, and dealers get a break in their routine. Result: better relations with better salesmen.

MOBIL OIL CO. dealers across the country are back at their pump islands this week more content with the company whose products they sell.

Why the better feeling? The dealers have just returned from "Mobil Dealer Conventions" in Las Vegas and in Kiamesha Lake, N. Y. About 2,000 dealers attended the two sessions.

The aims of the conventions are twofold: To make the dealers better gasoline salesmen and to raise their stature as businessmen.

The conventions have a potent psychological impact. Service station operators don't get many chances to break away from their day-to-day routine, but the Mobil conventions encourage dealers to break loose and spend a few days in a resort atmosphere with fellow Mobil operators.

Not all dealers attend the conventions, since they aren't subsidized by the company. The dealers pay their own way.

Success of the program is apparent by the jump in attendance. When the first meeting was held in San Francisco in 1957, only 225 attended. The Las Vegas meeting drew slightly over 2,000 delegates. Many of these were wives, but well over 1,000 dealers were represented. The attendance at Kiamesha Lake last week was expected to hit 1,500.

Mobil's Baxter F. Ball
. . . sees big gasoline future.

The company apparently is satisfied with the success of the program since this is the first year it has been a nation-wide affair. Before it was limited to 10 western states.

Management speaks. The conventions obviously give Mobil's management an opportunity to outline its thinking and plans to the men who sell Mobilgas to the public.

Albert L. Nickerson, chairman of the parent Socony Mobil Oil Co., Inc., used the Las Vegas convention as a means to use some plain talk on today's marketing problems.

The Socony chairman left no doubt Mobil is against dealer guarantees in pricing other than in those areas where dealers would become "dead heroes" without price support.

"It is my conviction that a cause of price wars is when suppliers extend guaranteed margins to jobbers and dealers," he said. "To base the wholesale price of gasoline to a dealer upon a discount from his retail price is like placing a gun in his hand.

"With it he can, with no economic

justification, force retail prices steadily downward in his entire market. And he does this with little or no loss of margin on his own sales."

Nickerson said wholesale gasoline prices should be based on the "economic realities of doing business" which are part of the company's area pricing plan. Experience has shown area pricing creates a more stable gasoline market, he said.

To the dealer facing stiff private-brand competition, he said the company is willing to adjust wholesale prices so that Mobil dealers "can compete with their private-branded competition on whatever basis they may find necessary to protect their own business."

Price wars. Nickerson said some of the recent price wars give the outsider the "picture of businessmen seemingly bent upon their own destruction."

They give the public the impression that marketers are "something like a group of men in a leaky boat who are frantically bailing the water in," he said.

The price disturbances which have hit the industry recently can be traced to the 1958 recession which caused the companies to try new ideas in an effort to increase profitability. However, some of these efforts have been based on a marketing philosophy which seeks volume regardless of profitability, he said.

Future sales. A long-range forecast made by Baxter F. Ball, Mobil's general sales manager, shows gasoline will have a growing market during the next 10 years, as the number of automobiles shoots up.

Ball estimates gasoline consumption will increase 27% in 1970 over 1960. This increase will come as result of 30 million more cars on the road driving 36% more miles.

Compact study to include gas and liquids

THE Interstate Oil Compact Commission is broadening its controversial study into "equal opportunity" of the oil states to produce their oil.

The subcommittee charged with the study did an about-face last week and decided in a San Antonio meeting to include natural gas and natural-gas liquids, as well as crude.

Purpose of the subcommittee is to study trends in reserves, production, shut-in capacity, and other factors in 13 producing states to determine whether each state is getting a fair share of the total market and, if not, to do what it can to achieve a "reasonable supply balance."

The group earlier had turned down a request to include gas liquids and natural gas. But Wyoming and Utah had threatened to pull out of the compact if only crude-oil were studied. Their reasoning: Some states, particularly Texas, are losing crude-oil markets to their own natural-gas and gas-liquids production, rather than to other producing states. It's only fair, they contended, to include the production of these other forms of energy in the study.

The decision to include them still must be passed on by the parent group, the compact's regulatory practices committee, which will meet during the compact's December 4-6 meeting in Denver.

The subcommittee also voted in San Antonio to recommend that the parent committee appoint ex-officio members representing each of the 13 producing states to sit in on the subcommittee's meetings.

It also decided not to go to oil companies for information in its study. This has never been done before by a compact committee, but such a move was approved earlier this year by the compact's executive committee.

Processing Briefs

A **Udex unit** is going up at Standard of California's Richmond, Calif., refinery. Fluor Corp. is doing the construction work. Completion is scheduled in February.

Polyisoprene latex production has been started by Shell Chemical at its Torrance, Calif., synthetic rubber plant. Capacity is 40 million pounds. Shell's Marietta, Ohio, plant, to be completed next year, will have an 80-million-pound per year capacity.

Helium production has begun at Kerr-McGee's extraction plant near Navajo, Ariz. The plant is processing about 1,700 M.c.f.d. of natural gas from the Pinta Dome field, containing about 8% helium. At full capacity the plant can process 2,500 M.c.f.d.

Benzene unit has been started up by Imperial Oil Co. at its Sarnia, Ont., refinery. The 30-million-gallan unit is Canada's largest. A portion of the output of the $5 million plant will be exported.

Facilities will be built by Marbon Chemical Div. of Borg-Warner Corp. at Baytown, Tex., to convert ethylbenzene into styrene monomer. Humble's refinery will provide charge stock for the 75-million-pound per year plant.

Cresylic-acid capacity will be increased at Jefferson Lake Sulphur Co.'s Houston plant from 2,200,000 gal. yearly to 2,860,000 gal. with completion set for next March. This plant was formerly known as the Merichem Division.

Propylene purification facilities to be built at Cities Service's Lake Charles, La., refinery are expected to be on stream by late spring 1962. The 100-million-pound per year unit will be constructed by Badger Manufacturing.

A new Canadian firm, Blackfoot Hills Pipelines, Ltd., is seeking a permit to build two 75-mile lines to connect Alberta's Lloydminster area with the Interprovincial Pipe Line at Hardisty, Alberta. A 4½-mile line would carry condensate from Hardisty to the producing areas for blending with the viscous crude. An 8⅝-in. line would move the blend back to Hardisty for batching via Interprovincial to eastern refineries.

Stepan Chemical, Northfield, Ill., will build a $7-million pthalic anhydride plant in Puerto Rico.

Shell leases offshore tracts

. . . in Mississippi waters near Louisiana border. Nearby wildcat will shed light on what two-state area holds.

AFTER 15 months of seismic work, Shell Oil Co. is ready to give offshore Mississippi a drilling test.

Shell is spudding a wildcat just 900 ft. inside Louisiana waters and adjacent to one of the company's two newly acquired 10,000 - acre Mississippi leases.

The well, 1 State Lease 3748, is projected to 16,000 ft. and will give the operators a line on what to expect in the two-state area.

Shell's seismic crews have surveyed 800,000 acres since mid-1960 in the Mississippi offshore territory from Louisiana to Alabama.

Shell has leased two 10,000-acre tracts located on the Mississippi-Louisiana offshore border and retained the option on 50,000 additional acres to the north and east (see map). It must pick at least one additional 10,000 - acre tract for each of the next 3 years to hold the option.

Shell pays $5-per-acre bonus for the leased tracts and $1-per-year annual rental. There is no rental if drilling is in progress. The state would get one-eighth royalty on any production, but Mississippi has yet to find any offshore oil.

There have been two unsuccessful tries for production in Mississippi waters off Hancock County in the vicinity of Shell acreage.

Gulf Refining Co.'s 1 State of Mississippi was drilled to 10,571 ft. before being abandoned Sept. 4, 1952. The well was reworked as Willis Hughes 1 State and drilled to 10,949 ft. before it was abandoned again June 4, 1957. Willis Hughes 3 State drilled to 10,006 ft. and was abandoned Nov. 12, 1957.

The Mississippi lease terms do not require Shell to drill on its new acreage, and the company said last week its drilling plans are partly dependent on the outcome of the Louisiana border well.

The border well is located near Half Moon Island just north of Grand Isle in Louisiana's St. Bernard Parish. There is no nearby production.

About 20 miles to the west there are two offshore fields in Louisiana. They are Shell Point and Lake Catherine. Further south there are three Louisiana fields: Eloi Bay, Lake Anathasia, and Lake Fortuna.

Meanwhile, the State of Mississippi is ready to consider any new leasing offers for the 730,000 acres turned back by Shell. Attorney General Joe Patterson, secretary of the Mineral Lease Commission, said that if any companies show an interest, a new lease sale would be held.

Water treatment used on wild oil well in East Hennessey field

BIG CHIEF Drilling Co. last week was trying to kill an Oklahoma oil well that blew out during fracture treatment.

The company said its Big Chief 1 John northeast of Hennessey in Kingfisher County—one of the nation's hottest oil areas—blew out because of tubing failure while Cleveland-zone perforations at 5,668-83 ft. were being fractured.

Several service-company workers, four Big Chief rig crewmen, and the production superintendent were on the rig at the time, but all escaped injury.

Oil spurted from the hole at the rate of more than 50 bbl. an hour for several hours. The stream dwindled to periodic surges as more gas mixed with the crude, and Big Chief started pumping in water in an effort to tame it. Precautions were taken against fire.

The company didn't expect any big problems in controlling the flow.

The company earlier had completed the dual-zone well for production from the Meramec at 6,386-6,487 ft. The deeper zone flowed 162 bbl. in 16 hours through a 20/64-in. choke.

Location of the well is C NE NE 7-19n-5w, about 8 miles east and 3 miles north of Hennessey.

Machinists picketing Gulf Oil plant again

SUPERVISORS at Gulf Oil Corp.'s refinery at Port Arthur, Tex., were operating some of the refinery units last week after members of the Oil, Chemical & Atomic Workers Union refused to cross picket lines of striking machinists.

The machinists had earlier halted picketing during negotiations for a new contract with Gulf but restored them. The OCAW, which had been working without a contract, observed the lines, and the supervisors took over. Job security and contract work are the issues in the work stoppage.

Old pipeline proposals may be revived

Suwanee may be extended to New Jersey, a line on to Boston is being restudied. And here's a new one: a New York system to unload big tankers.

Paul Reed
Pipeline editor

SOME OLD pipeline projects for the East Coast are being dusted off and reevaluated.

All of them have been proposed for several years but have been dropped for economic reasons or because of obstacles which stood in the way. Altogether they could cost well over $150 million.

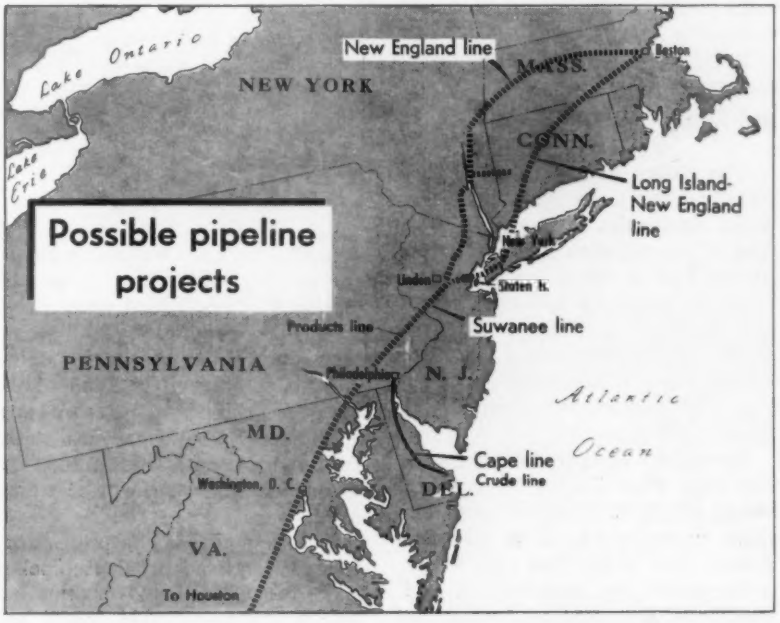
They may not bring a round of construction immediately, but companies are now looking seriously at these proposals:

1. **An extension** of the proposed Suwanee products line to Linden, N. J. Suwanee, as now designed, would start near Houston and wind up in North Carolina. A decision on the new extension is expected in a matter of weeks.

2. **A line** to move products from New Jersey on to Boston. Two routes have been proposed. One would follow a railroad right-of-way and move inland to Boston. The other would go to Staten Island, cross to Long Island to serve Idlewild field, then cross the Long Island Sound and go on to Boston.

3. **A crude-oil line** which would extend into the lower Delaware Bay to receive crude from supertankers and move it to the Philadelphia refining area.

4. **The Port Authority** of New York is studying the feasibility of an offshore terminal to handle all or part of the daily receipts of 900,000 bbl. of product and 300,000 bbl. of crude entering that port. Pipelines to some of the 25 storage terminals would obviate deepening certain channels to accommodate supertankers.



1. The Suwanee line

The Suwanee project has been a long time in the making. Conferences among major companies were held on the project in 1951, 1953, and 1956.

It is expected that the line will start in the Houston area and parallel the main line of Plantation Pipe Line. In recent weeks Suwanee has had an office in Atlanta manned by 18 engineers.

The proposed extension would reach Linden, N. J., by way of Richmond, Va.

2. New England line

The two biggest delayed projects are those planned for Long Island and New England.

They are becoming significant now because Sun Oil Co., together with two or more major companies, is taking another look at the future value of these projects and actively studying the problems which up to now have made them economically unattractive.

During the past 10 years nearly all the major companies marketing between New Jersey and Boston have studied the possibilities of these two projects. Negotiations have been carried on with railroads for the use of right-of-way.

In the plans, which have been dropped for some time, proposals were considered and discarded for entering New England by one of the two available routes. Special attention was directed to laying a line from Linden, N. J., which would use railroad right-of-way on the west bank of the Hudson River as far as Peekskill, N. Y., where it would cross over. Mention has been made of proposals to run north perhaps to Albany with a lateral going east at Poughkeepsie.

Another approach to New England, considered and discarded, was a line from Linden, N. J., via Staten Island and Long Island to a crossing of Long Island Sound. By either of these alternative routes the product pipeline would go to a terminal on the outskirts of Boston.

Economics of supplying the Long Island and New England areas have shown a standoff between existing marine costs and the proposed pipeline costs, including railroad right-of-way rates which have seemed too high.

Cost factors. A change to pipelines would mean distrubing the existing terminal and storage arrangements and marketing patterns developed to take advantage of low-cost barge-shuttle service in the New York Harbor area. But in the face of the tendency for marine trans-

portation costs to increase, it is realized that pipeline operating costs are relatively level. The two cost curves may cross to the advantage of pipelines proposed for New England as well as Long Island. To foresee this sufficiently in advance, some major companies are following a policy of revaluating the situation every 2 years.

In the long run barge costs go up faster than pipeline costs. The future is favorable to these pipelines.

The Long Island line. In approaching the Long Island problem, major companies appear to favor a type of management and ownership exemplified in the Everglades Pipe Line Co. setup for serving the jet-age needs of the Miami International Airport through a 34-mile, 10-in. line—a miniature of what would be involved in a Long Island project.

Everglades is operated by Buckeye Pipe Line Co., a large share owner which is acting as agent for three major integrated oil companies. This is the first case where a non-producing, non-refining and non-marketing company has headed a group of integrated oil companies joining in the ownership of a pipeline.

Pipeline for Idlewild. The most conspicious function of a Long Island pipeline would be that of supplying the Idlewild International Airport, reported to be using 34,000 bbl. of fuel daily. Its needs will be steadily increasing.

Some day Idlewild should have a hydrant system of fueling aircraft such as is used at O'Hare at Chicago and at the Miami International Airport. The volume at the Newark and LaGuardia airports is not yet sufficient to class them with Idlewild in respect to needs for hydrant and pipeline service.

At present, aviation gasoline and jet fuel are barged to a marine terminal of the Port Authority and trucked from there to nearby Idlewild Airport. Heating oil and gasoline for this area are barged to the Inwood terminal point.

A prospective Long Island pipeline system would aim at functioning on a scale commensurate with the large needs of Long Island which is estimated to be using about 300,000 bbl. daily — one of the greatest marketing areas with its population of between 5 and 6 million. If Long Island were a separate state, populationwise it would rank seventh among the 50 states.

With completion in 1965 of the bridge now under construction across the Narrows between Staten Island and Long Island, market demands in both areas will be stimulated.

The first pipe laying preparatory to a Long Island products pipeline was for a 6,000 ft., 24-in. line last year between Staten Island and Long Island. It is now capped and lies waiting for use in a possible products line or for gas or cable service. This is one of two 24-in. lines owned by Narrows Crossing, Inc., controlled by the estate of the late Victor Gallucci.

Long Island Railroad. East Coast Pipeline Co., also controlled by the Gallucci estate, has an agreement with the Long Island Railroad for a 60-year lease of more than 250 miles of right-of-way for pipelines.

Several years ago, East Coast announced plans for building a 90-mile products line of 12-to 24-in. pipe from Linden, N. J., to Suffolk County on Long Island. Reports were prepared by Pipe Line Technologists, Inc., and Stone & Webster Service Co. Financial arrangements were undertaken by Carl M. Loeb, Rhoades & Co., which regarded the undertaking as a 75-mile, 20-in. products system from New Jersey refineries to Idlewild and La Guardia airports.

Throughput guarantees. Efforts to finance were dropped when it was found that for a project of this kind it would be necessary to have guarantees in advance from major shippers. Such guarantees were not obtainable because the petroleum industry is accustomed to using its own credit for building its own pipelines.

Pipeline profit. Pipelines operate at a low rate of return, for their objective is to provide the petroleum industry with low-cost transportation. In the course of negotiations it became apparent that the policy of the industry is to provide its own pipeline transportation, without dependence on outside organizations.

In the long run, the advantage of the proposed Long Island and New England pipelines would come, not through pipeline profit, as much as through contributing to low cost distribution through fairly level transportation rates and assurance of continuity of service.

3. The Cape line

This proposed system also has been a long time in the planning stage.

It would move crude oil from ocean tankers unloading in lower Delaware Bay to the Philadelphia refining area.

This undertaking, sponsored by Sun Oil Co., Cities Service Co., and Atlantic Refining Co., would make it possible to start from a point where supertankers of 50-ft. draft would be in 80 ft. of water.

At present, the channel cannot accomodate such tankers and their oil cargoes must be transferred to lighters of shallower draft.

Time is not yet considered ripe for this line, which originally was scheduled for completion in 1960. There is a problem of dealing with existing marine arrangements.

Tax question in station sales cleared up

THE federal gasoline tax will not be included in computing sales at a service station to determine whether the station's sales volume brings it under coverage of the fair labor standards act.

Net effect is that many stations which might have otherwise been included in the coverage will not be subject to the provisions of the act now.

There had been some confusion on this point, with earlier indications that the Department of Labor would count the taxes in determining the gross sales volume.

The Department's new view was disclosed last week in a letter from Charles Donahue, solicitor of Labor, to Rep. James Roosevelt (D.-Calif.).

Offshore play takes shape in Nigeria

AN OFFSHORE oil play is shaping up in a West African country that almost without notice has moved into nineteenth place among the free world's oil-producing countries.

The country, Nigeria, has granted offshore rights at the mouth of the Niger River delta to three American majors—Mobil, Caltex, and Gulf. They will explore individually-held acreage adjacent to onshore and offshore rights held by the old hands in the country, Shell and British Petroleum. The British-Dutch combine recently upped onshore production to 64,000 bbl. daily, or triple the level of last spring.

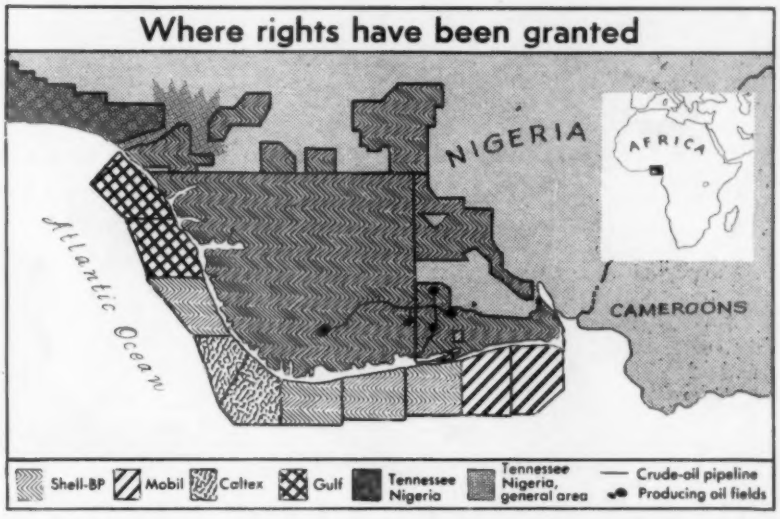
Another American company, Tennessee Nigeria, Inc., does not have an offshore block as such. But the subsidiary of Tennessee Gas Transmission Co. can get its feet wet if it wants to with a big license area along the Atlantic coast. This entitles it to offshore rights out to the 3-mile limit.

Here is a rundown on the current situation:

Shell-BP Petroleum Development may be the first to drill on its offshore tracts. It has a drilling tender in the area. For nearly 4 years the tender has serviced deep tests drilled from fixed platforms in tidal mangrove-swamp areas of Shell-BP's onshore concessions.

Three out of four of the company's offshore tracts form a 107-mile strip extending outward as far as 30 miles from the 3-mile limit. This strip offsets scattered fields that currently are the source of commercial production. The fourth Shell-BP tract lies along the delta to the northwest.

Mobil International has given up a 2.5 million-acre onshore tract in western Nigeria after drilling three dry holes. It will now try its luck on two offshore concessions in eastern Nigeria east of BP-Shell acreage. The new Mobil blocks run for a total of about 60 miles along the coast, and extend seaward at one point as far as 35 miles out from the 3-mile limit.



American Overseas, exploration affiliate of the Caltex Group, has two blocks off the center of the delta's bulge, with Shell-BP acreage lying on either side. Little work has been done so far.

Gulf Oil's two blocks lie to the northwest of Shell-BP's single tract. Here, too, little if any actual work has been done.

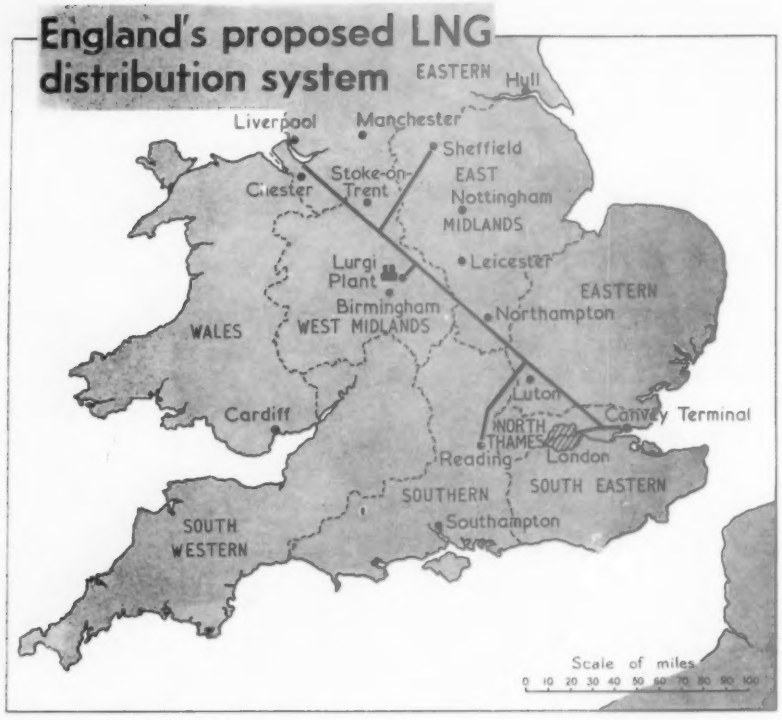
Tennessee Nigeria recently signed formal contracts covering two concessions on which surface work had already started. A seismic program is now in progress on a 1,280,000-acre tract awarded in April 1960. The crew soon will shift to an adjoining 960,000-acre concession to the east, awarded later, which partially wraps around Shell-BP leases in the area. The company started geological and geophysical work in the region in September 1960.

Production grows. Exploration work started 24 years ago. But noncommercial shows in wildcat after wildcat teased Shell and BP along in the multimillion dollar oil search for nearly 20 years before a commercial well was brought in at Oloibiri.

A series of discoveries has been made since then. Five of these are on commercial production: Oloibiri, Ebubu, Imo River, Afam, and Bomu. Output was limited to about 20,000 bbl. daily earlier this year until a new 18½-mile 12-in. pipeline was completed to the mouth of Bonny River, where a new $3.5 million terminal opened in May. Tankers of up to 18,000 tons can negotiate a newly dredged channel at high tides. Vessels previously loaded at Port Harcourt, 40 miles upriver, had to pass over a sand bar half loaded, and lightered from smaller tankers later (OGJ, May 29, p. 121).

While output of 200,000 bbl. daily by 1970 is the official production target, the country is expected to be capable of producing that much oil—and more—years before that. Reportedly the chief reason why output capacity could not reach as high as 300,000 bbl. daily by 1965 is not a lack of reserves, but local geography. Inhospitable country, much of it swamp, and the lack of a better port are the drawbacks.

Nigerian crude has two natural advantages. The country is as close to Europe as Venezuela, and the crude produced in Nigeria has a low sulfur content.



UK approves first LNG imports

LIQUEFIED North African natural gas will flow into British gas mains at the rate of 100,000 M.c.f. daily just 10 years after U. S. engineering studies advanced the theory that tanker movement of gas was a commercial possibility.

The British Government approved the first commercial project last week over the opposition of its nationalized coal industry (OGJ, Nov. 6, p. 87, Sept. 18, p. 81).

The British move may well be the first step of a world-wide movement of liquefied gas. It is certain to have a profound influence on Europe's future energy-supply picture.

Sir Henry Jones, chairman of the British Gas Council, conceded last week in London that the initial rate of gas imports may be stepped up later. "We have to start somewhere," the council chairman commented.

Seven of Britain's 12 area gas boards will be supplied with Saharan natural gas in the initial project. Under the timetable announced last week in London, the gas will be shipped from a liquefaction plant at Arzew, near Oran, in two 28,000-ton specially built tankers. At Canvey Island in the Thames River it will be reformed into British "town gas" and go into a pipeline serving the various gas boards.

The gas imports are expected to replace 800,000 tons of coal and about 400,000 tons of oil a year by 1965.

Soviet gas output may fall behind ambitious goals

RUSSIAN natural-gas production, despite big gains, may not be keeping pace with the ambitious plans set by the soviets.

Output this year will rise nearly 27% to 5.75 billion cubic feet daily. Even so, deliveries have been lagging. And no mention was made by Premier Khrushchev at the recent Communist Congress of fulfilling the 7-year-plan goal of 150 billion cubic meters, or about 14.5 billion cubic feet daily, by 1965.

Foreign Briefs

A 26,000-bbl. refinery will be built soon by Esso Standard Oil, SA, at Kingston Harbor, Jamaica. The government gave the green light for the $16,800,000 project 2½ years after the Jersey Standard affiliate received initial approval. Crude will be imported from Venezuela. Construction will start early next year.

A refining concession in the Cape Verde Islands, off West Africa, has been awarded by Portugal to Golden Eagle Refining Co., a wholly-owned subsidiary of Ultramar Co., Ltd. Details of an agreement for a 15,000-bbl. plant are now being negotiated. Golden Eagle will have 60% interest in the venture, which includes a favored marketing position in Portugal.

An ethylene plant with capacity of 70,000 tons a year will be built at Wesseling, West Germany, by Union Rheinische Braunkohlen Kraftstoff. Most of the product, along with propylene production, will be purchased by Farbwerke Hoeschst AG and a subsidiary, Knapsack Griesheim.

Aramco has started deliveries under the first sales contract for natural gas for industrial use in Saudi Arabia. The company will move up to 3,600 M.c.f.d. via a 7-mile 8-in. pipeline to Saudi Cement Co., located between Abqaiq and Hofuf, for a 19-year period. The plant has a capacity of 300 tons of cement per day.

A seismic survey in the Persian Gulf off the coast of Saudi Arabia is being started by Aramco. Geophysical Service, Inc., using a 158-ft. vessel, The Sonic, will survey about 2,000 miles of line over a 2-month period.

Russian survey crews have joined American Overseas, a Caltex subsidiary, in prospecting on the Spitzbergen Archipelago, 370 miles north of Norway. The soviets, who have operated coal mines in the islands for years, have separate licenses.

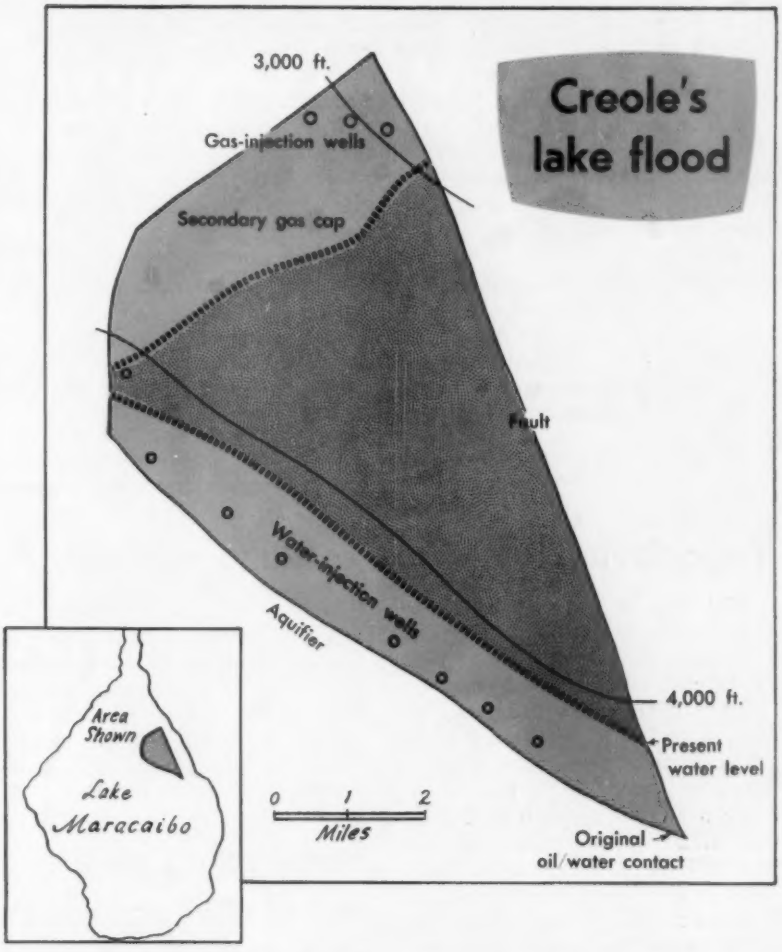
First Maracaibo water flood to be a big one

Creole will inject 320,000 bbl. daily in eight-well flood.

LAKE Maracaibo's first water flood will be a king-sized project pushing 320,000 bbl. daily into a Creole Petroleum reservoir by mid-1962.

The flank flood will help drive the company's LL-5 reservoir in Bolivar Coastal field. It was designed to be used in connection with injection of 100,000 M.c.f. of gas through three wells into the crest of the structure.

LL-5 is one of Creole's youngest reservoirs, discovered only 3 years ago. But it already has an MER of 180,000 bbl. daily, equal to a fifth of the company's potential for medium and light crudes in western Venezuela.



Eight-well program. Creole will use eight wells in the flood, injecting 40,000 bbl. daily of lake water at each spot in normal operation. Objective of the flood will be to reverse a pressure decline and increase pressure by 200 to 300 psi. To build up the pressure, injection wells will initially discharge 60,000 bbl. daily into formation at 1,270 psi. This will be cut back to 40,000 bbl. daily at 1,570 psi. after pressure is built up.

The wells will be spotted in a line along the oil-water contact on the southwestern side of a 25,000-acre, triangle-shaped reservoir. The monoclinal strat trap is bounded by a fault on the east, and a shale-out of sands on the northwest. Average net thicknesses of two oil sands: 255 ft. and 95 ft.

Package deal. A self-contained, unattended injection package will be located at each spot. Each package will contain a charge system, a deaeration unit, a pump package, and a transformer-and-electrical-control unit.

The packages will be light and compact enough to be picked up and taken to shore for overhauls. This will enable Creole to periodically overhaul all injection facilities without shutting down the flood.

Saves money. Creole studies of lake water showed that extensive treating equipment was not needed to maintain the desired input rate.

The water is highly corrosive. But this condition is caused by a high oxygen content, which can be reduced by gas stripping in deaeration towers.

This finding enabled Creole to plan small deaerators at each well and to eliminate the need for a central treating station and connecting pipelines. The saving, plus the fact that a test injection well indicated 8 rather than 12 input wells were needed, will amount to a reduction of $4 million over the originally planned investment.

The project will now cost about $4.5 million initially, and will take $1 million a year to operate. This compares with an original investment estimate of $8.5 million, with operating costs of $2.3 million a year.

Amoseas personnel have done surface work in Spitzbergen for the past two summers.

ENI plans to add another refinery outlet to its pipeline system being built northward from Genoa into Central Europe. This will be an 80,000-bbl. plant in Pavia Province of the Po Valley. The Italian state agency plans to put the refinery into operation the first half of 1963.

Russian crude output this year will reach 165.8 million tons, Premier Khrushchev says. This will be about 3,316,000 bbl. daily, or 36,000 bbl. daily over the soviet's 1961 goal. It will be a gain of 356,000 bbl. daily, or 12% over last year.

Borneo pipeline to use water-oil slurry

A WATER-OIL slurry will be used to move 40,000 bbl. daily of crude through a 160-mile pipeline newly completed by Royal Dutch-Shell in Indonesian Borneo.

The unusual method of carrying crude in a 30% water suspension will be used by P. T. Shell Indonesia. It will be a means of moving a waxy, high-pourpoint crude through the 20-in. system without the need for a heated pipeline that would require intermediate heating stations.

The $50-million line will move crude from Tandgung oil field to the coastal town of Balikpapan, where Shell operates a 75,000-bbl. refinery. Construction through the island's swamp and jungle took 11 months. Another $14 million is being invested in development drilling at Tandgung, where 66 wells have been completed.

Shell discovered Tandgung in 1938. The field remains the company's last untapped oil reserve in Indonesian Borneo.

Cumulative production so far is only a little more than a million barrels. Output from the field is expected to be increased to 65,000 bbl. daily later.

Yugoslavia to step up refining capacity

ENI may be the contractor for a refinery-expansion program in Yugoslavia that will include a new 24,000-bbl. plant at Pancevo.

The contract, now being negotiated, includes a proposal for an ENI-run exploration program in the Vojvodina area. If a bargain is made it will be a switch in the recent trend of communist inroads into refining and exploration ventures in free-world countries.

The Pancevo plant is expected to go on stream 3 years after the agreement is signed. It will yield about 4,600 bbl. daily of gasoline, 11,000 bbl. of diesel fuel, 900 bbl. of lubricating oils, as well as petroleum coke, asphalt, and light ends.

Existing plants to be expanded are at Isak, Fiume, and Bosanski Brod. Present total refining capacity in the country is 26,000 bbl. daily, barely enough to meet domestic demand or handle local crude production. And both are rising.

Supplies for the Pancevo refinery will be produced in fields in Northeast Yugoslavia, where output of much more than the present 5,000 bbl. daily can be sustained. Part of this supply is a heavy crude, which cannot be handled in existing plants.

In addition to expanding crude production, recent drilling has produced a sevenfold increase in gas supplies. Pipe is already being delivered to construction sites for a gas pipeline from Kikinda to Pancevo, where it will supply a fertilizer plant and other industries. The line will be expanded later to Novi Sad and Sremska Mitrovica, which also are in the northeast part of the country. And petrochemical plants are being planned to take advantage of gas supplies in the Elemir area.

Mobil scores on first test of new acreage in western Venezuela

MOBIL International has hit pay dirt in its first well on its new Barinas concessions in western Venezuela.

The company's 1 Hato has tested a total of 2,568 bbl. daily from two zones through ½-in. chokes. The well, drilled to 9,550 ft., has about 140 ft. of oil sand. It lies only 5 miles from the main pumping station on the Mobil-Sinclair pipeline from Barinas to the Caribbean coast at El Palito, where Mobil has a 50,000-bbl. refinery.

Mobil now accounts for half the 70,000 bbl. daily Barinas output.

The well is on 47,600 acres of concessions acquired earlier this year from Esperanza Petroleum Corp. Esperanza, owned 68% by Amerada Petroleum Corp., had invested $4 million in the acreage and will receive 13.5% of any net profits.

Hato 1 was spudded in September on a westward extension of Sinclair's Sinco field. The well is about 1⅓ miles from the nearest well and is 4 miles southwest of Mobil's Silvestre field.

Mobil will drill a second well on the Esperanza acreage this year.

Petrochemical center in Argentina to be built by Fish International

FISH International Corp. of Panama, one of five U. S. companies building a $70-million petrochemical complex near San Lorenzo, Argentina, will do the engineering and construction work on the 3-year project.

Petroquimica Argentina, SA (PASA), the Argentine company formed by the American interests, said an 800-acre site has been acquired adjacent to the Argentine-owned YPF refining center at San Lorenzo and preliminary field work on the complex will start shortly.

The Fish company is an affiliate of Fish Engineering Corp., Houston, a partner in PASA along with Cities Service, Continental Oil, U. S. Rubber, and Witco Chemical.

The complex, which will take raw materials from the refinery, will produce butadiene, styrene, synthetic rubber, benzene, motor fuel, alkylate, and chemical intermediates.

ENI works on deal to build 30,000-bbl. refinery in Ceylon

CEYLON has agreed to let ENI build a 30,000-bbl. refinery on the island, and all that remains to be decided is the location and whether the Italians will have part interest.

The likeliest site for the project is the former British naval base at Trincomalee, where large tankage facilities are available. The drawback to this location is that the main consumption areas are in western Ceylon, on the opposite side of the island, and in the central regions. Road transport is not feasible, and either a pipeline or coastal tankers would be required.

An oil man's guide to Washington

BY CLYDE LA MOTTE
Washington editor

- **General scene:** More Government officials with a voice in your business. But oil is being used less as a whipping boy.
- **In Congress:** Watch the key committees which handle oil-related issues.
- **At the White House:** Your story will be heard, but the Administration is noncommittal on many oil issues thus far.
- **At Interior:** Industry help wanted to upgrade the department's role in oil.
- **At Justice:** You'll encounter a tough, skeptical attitude toward business generally, including oil.
- **At Commerce:** A gold mine of economic statistics, business information.
- **At Office of Emergency Planning:** Key policy decisions pending which will affect import controls.
- **In the Courts:** Cases testing virtually every government oil or gas action.
- **Regulatory agencies:** New faces and new policies. Big impact ahead.
- **Other agencies:** These get into the oil act, too, so don't overlook them.

Capitol, where the nation's laws are written.

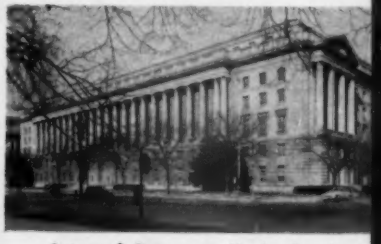
White House, where top executive decisions are made.

Supreme Court, where the nation's laws are interpreted.

Department of Interior, hub of government oil action, above, and **New GAO Building,** below, home of Federal Power Commission.

Pentagon, where military's top oil planning is done.

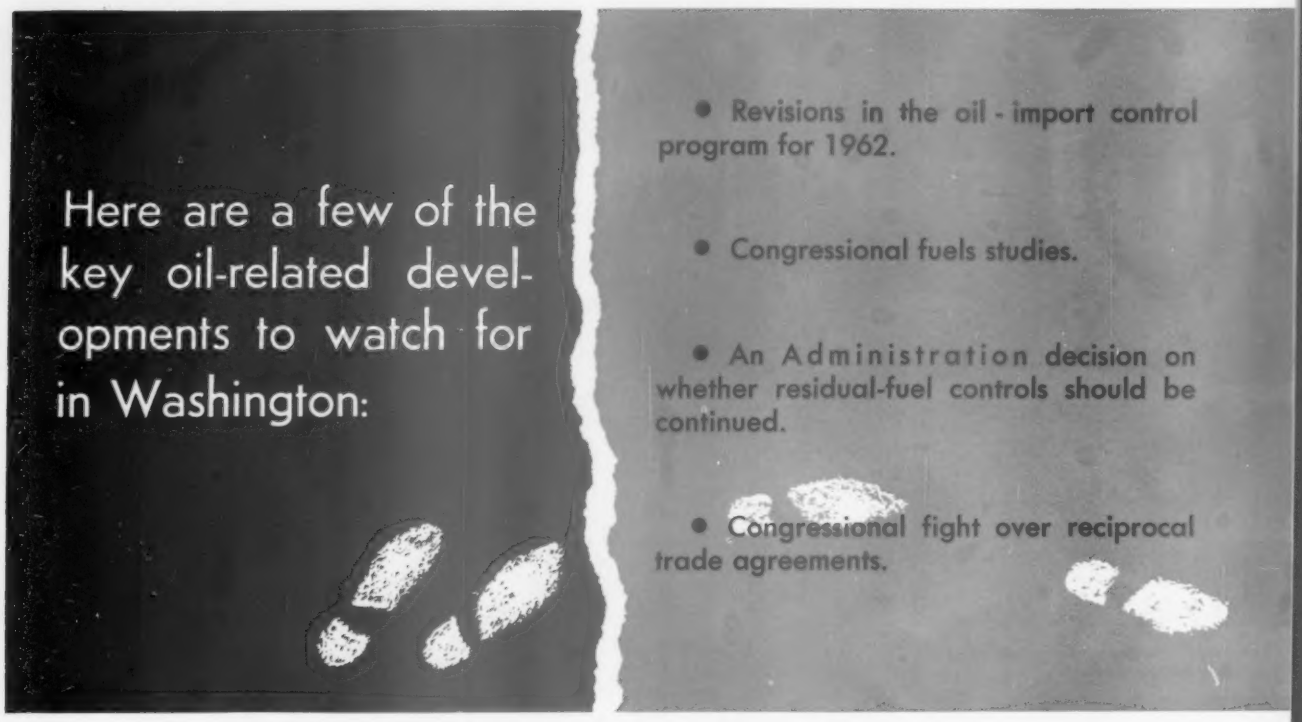
Federal Trade Commission, rides herd on antitrust.



Internal Revenue, Uncle Sam's tax collector.

Department of Justice, Government's legal arm.

Department of State, where foreign policy is drafted, above, and **Department of Commerce,** below, center of business-related activities.


Here are a few of the key oil-related developments to watch for in Washington:
• Revisions in the oil - import control program for 1962.
• Congressional fuels studies.
• An Administration decision on whether residual-fuel controls should be continued.
• Congressional fight over reciprocal trade agreements.

Casing the joint

WALK INTO virtually any of the complex of government buildings in Washington, D. C., and you will find officials at work on some project involving the oil and gas industry.

Their decisions can—and do—affect your business and the way you run it, regardless of the segment of the industry you are in. It's an eye-opening experience when you first realize government's full impact on oil.

A tour from office to office, from building to building, drives home the realization of just how deeply the Government has become involved in oil and gas-industry operations.

Some of these actions may have a relatively limited impact, such as a Department of Labor interpretation as to whether the wage-and-hour-law extension brings fuel-oil-jobber employes under the overtime provisions or not.

Or it can be a decision felt throughout the industry. For instance, within a few days the White House will issue a presidential proclamation setting the size and scope of the 1962 oil-import-control program. This will have far-reaching effect on the industry, particularly to the independent producers.

The list of actions, recent or pending, by one branch of the Government or another is almost endless. And it continues to grow.

This is true in all three of the major branches of the Government—executive, legislative, and judicial—as well as in the so-called independent regulatory commissions.

There are occasions when a three-ring circus develops with each of the three branches involved with a given oil-related problem.

Testing the "climate"

Much is said from time to time about the oil industry's "climate" in Washington. Since climates can change, it is well to take a reading from time to time.

Generally speaking, oil is faring reasonably well in Washington now, certainly so by comparison with some less-happy times in the past.

Congress, for example, has taken no "antioil" action in years. And the use of the oil industry as a whipping boy on Capitol Hill is becoming less and less frequent.

The Administration, while far from embracing oil, has shown little hostility toward the industry. Rather, it has tended to display an open mind, willing to let the industry state its case.

Regulatory agencies, too, are showing a better understanding of the industry and its problems, although there are some obvious exceptions.

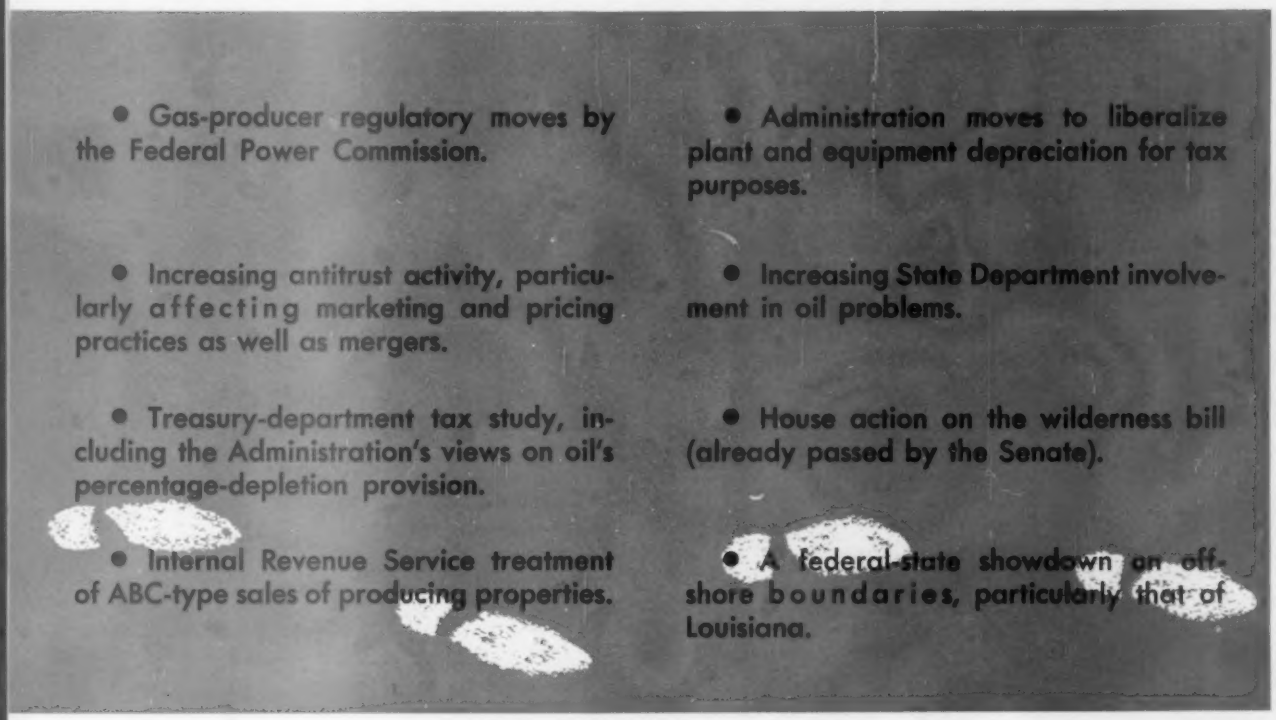
Looking for clues

The seeming improvement of oil's standing in Washington cannot be traced to one single, dramatic incident which changed the situation overnight.

Rather, it has been an accumulation of a series of lesser developments in which oil fared well.

For instance, there were charges early last year of gas-industry "influence" at the Federal Power Commission, and congressional-committee hearing ensued.

As it turned out, the chief result of the hearing was that it put the spotlight on the virtual helplessness of the commission to cope with the staggering backlog of cases. The "influence" charge evaporated.


• Gas-producer regulatory moves by the Federal Power Commission.
• Increasing antitrust activity, particularly affecting marketing and pricing practices as well as mergers.
• Treasury-department tax study, including the Administration's views on oil's percentage-depletion provision.
• Internal Revenue Service treatment of ABC-type sales of producing properties.
• Administration moves to liberalize plant and equipment depreciation for tax purposes.
• Increasing State Department involvement in oil problems.
• House action on the wilderness bill (already passed by the Senate).
• A federal-state showdown on offshore boundaries, particularly that of Louisiana.

And there was the fiasco of the suit against 29 oil companies charged with conspiring to hike crude and product prices.

Then there was this year's antioil tirade by Sen. William Proxmire (D.-Wis.) in an effort to block Senate confirmation of the appointment of L. J. O'Connor, Jr., to the Federal Power Commission. About the only results produced by the senator's one-man filibuster were loud yawns.

It was noteworthy, too, that the perennial attempt in the Senate to attach a depletion-reduction rider to some House-passed bill was not even attempted this year.

You will also recall that the industry was not made the scapegoat in that tempest-in-the-teapot incident earlier this year over a letter written by an oil-company representative soliciting ticket purchases to a Democratic party fund-raising dinner.

There have been less-known developments which have further helped to put oil in a better light. One of these stemmed from a month-long examination of the Military Petroleum Supply Agency's oil-purchasing records and procedures.

This examination was made last year by a team of investigators from the Justice Department, and it's a good bet they were searching for any indication of over-pricing or price-rigging, or supply contract rotation. But in the report they finally made, they gave MPSA glowing praise, a clear indication that they could find nothing amiss.

Those, then were some of the weather vanes. This does not mean, of course, that oil's problems have disappeared, but only that oil is getting a better, fairer hearing. Of course, there is no guarantee that the current improvement will continue.

Learning a lesson

If the thesis that oil is making some progress in Washington is a valid one, it would be well to look at some of the factors that have brought this about and thus improved the climate.

Perhaps the most important of these is that oil is doing a better job of telling its story in Washington. It has been forced to do so because of the Governments's increasing involvement in oil issues and problems.

This exposure has. in turn, tended to create a better understanding between government and industry officials, setting the stage for calmer and more reasonable discussions of such sticky problems as oil-import controls and federal regulation of natural-gas producers.

There was a time when oil men went to Washington reluctantly and warily, and sometimes with a chip-on-the-shoulder attitude.

Often they were met with equal wariness and suspicion on the part of the government officials. Such settings still exist, but less so than in the past and usually involving an agency of the government that has had few previous dealings with the industry.

On the other side of the coin, the industry's increased exposure to Washington has given many oil men a better awareness of the Government's problems and procedures. This, too, has helped create a better understanding and to make communication between the two a bit easier.

As more and more oil men learn their way around Washington circles and find a growing number of familiar faces behind government desks, some of the mutual distrust and fear evaporate.

Much of the basic work done in congress is by committees. Here are some of the key ones which handle oil-related legislation:

House Ways and Means takes first action on all tax legislation. Chairman: Rep. Wilbur Mills (D.-Ark.).

House Rules Committee schedules committee-approved legislation for floor action. Chairman: Rep. Howard Smith (D-Va.).

Select Committee on Small Business makes studies of problems of small firms. Chairman: Rep. Wright Patman (D.-Tex.).

House Judiciary Committee passes on antitrust and related legislation. Chairman: Rep. Emanuel Celler (D.-N.Y.).

House Interior and Insular Affairs acts on mineral leasing laws and similar measures. Chairman Rep. Wayne Aspinall (D.-Colo.).

House Interstate and Foreign Commerce handles matters involving interstate commerce (such as natural gas). Chairman: Rep. Oren Harris (D.-Ark.).

Congress: Battles shaping up on several

THERE ARE important developments shaping up in Congress which will be of unusual importance to the oil industry.

One of these concerns a national fuels policy. A House subcommittee, headed by Rep. Tom Steed (D.-Okla.) is beginning a series of hearings next week on the oil-import-control program and other factors related to the nation's fuels resources.

A similar study is under way by a Senate committee, chairmaned by Sen. Clinton Anderson (D.-N. M.), which already has its staff at work on a long, broad investigation.

It is unlikely that any specific legislation will stem from these studies. Even so, they could cause considerable broad impact.

But looming much larger on the immediate horizon is the battle that is shaping up over the Trade-Agreements Act, which comes up for renewal next year.

Oil is likely to become deeply involved in this showdown fight, and the long-range ramifications are enormous.

Basically, this is the old, old struggle over whether trade restrictions should be kept at a minimum to encourage a freer flow of goods throughout the world, or whether the restrictions should be tightened to protect and strengthen domestic industries.

The rapid increase in recent years of the flow of goods from abroad has prompted insistent demands by more and more industries that major revisions be made in the present trade-agreements setup to provide prompter and more effective protection to domestic industries that are suffering from the impact.

Meanwhile, the Administration appears to feel strongly that such a move would put this nation on the road to isolationism, and would be a sharp blow to free world solidarity at a crucial time. It is launching a powerful drive to liberalize, rather than restrict, trade policies.

In effect, much of our foreign policy and future role in world affairs rides on the outcome of the pending fight, which overshadows all other issues Congress will face in 1962.

Oil has a particular stake. The present oil-import-control program rests on a section of the act which authorizes the President to institute import controls over a product upon certification to him that such controls are essential to the national security.

And while next year's fight will not be over this particular section of the act, oil-import controls could be affected directly or indirectly.

Whatever the outcome, there is the strong possibility that the industry will be sharply divided over the issue.

It is natural to assume that many in the producing

Senate Committee on Commerce duties include, among others, passing on Presidential appointments to Federal Power Commission and Federal Trade Commission. Chairman: Sen. Warren Magnuson (D.-Wash.).

Senate Interior and Insular Affairs is currently handling the Senate fuels policy study. Chairman Sen. Clinton Anderson (D.-N.M.).

Senate Select Committee on Small Business. Chairman: Sen. John Sparkman (D.-Ala.).

Senate Judiciary Committee. Chairman: Sen. James Eastland (D.-Miss.).

Joint Economic Committee. Chairman: Rep. Wright Patman (D.-Tex.).

Joint Committee on Internal Revenue Taxation. Chairman: Rep. Wilbur Mills. D.-Ark.).

oil-involved fronts

segment of the industry will side with those seeking tight controls, while major and international companies and marketers will tend to support world trade expansion policies.

Other oil issues. There will be other legislation, other committee investigations involving oil in Congress next year.

One of the probes is a study currently under way by a House subcommittee under the direction of Rep. James Roosevelt (D.-Calif.) aimed at determining whether service stations have an opportunity to own their own stations.

A wilderness bill, already passed by the Senate, is currently under study by a House committee and will come up for action next year. This bill, if passed, will seal off a larger amount of public lands from possible oil exploration and development.

Various antitrust measures are also in the hopper and will get some consideration, particularly so because of stronger backing from the new Federal Trade Commission majority and the Justice Department.

Tax revisions will get some discussion, too, although no major overhaul is in sight for 1962. However, some interim changes will be considered. If so, they are likely to include some type of additional tax incentive for new equipment and plant expansion.

New leadership. Aside from possible legislation, the most important development in Congress next year is likely to be the selection of a speaker of the House to succeed Speaker Sam Rayburn.

The outlook now is that the new speaker will be Rep. John McCormack (D.-Mass.), although that is far from certain. If he is selected, attention will then turn to the choice of a House majority leader.

This change in leadership will lead gradually to other changes, including committee assignments and the priority given to particular legislation.

How much impact this will have on oil remains to be seen, but there is little doubt that Rayburn's loss will be felt, for he knew and understood the industry and its problems. His influence was felt not only in the House but throughout government circles and at the White House.

Administration: Tends to display open mind

WASHINGTON OBSERVERS have noted that in recent years the major impact on industry operations usually comes from executive action, rather than from congressional action.

Congress sets the boundaries, of course, but it often passes "permissive" legislation which leaves to the executive branch the decision of when and how to apply the authority granted it.

One obvious example of far-reaching administrative power was the issuance of the original presidential proclamation setting up a mandatory oil-import-control program.

There is nothing in the authorizing legislation (Trade-Agreements Act) about sliding-scale formulas, historic importer quotas, inland refiners, or exemption of overland imports. All of this stemmed from executive action.

Clearly, then, awesome power rests in the hands of the executive branch of our Government.

That is why an oil man visiting in Washington must spend much of his time in the various executive departments if he hopes to get an idea of previous action on matters affecting him.

That is why, too, a changing administration can be so important, for a new set of government officials may chart a course far different from the one of their predecessors.

1. The Kennedy approach

Thus far, the administration of President John F. Kennedy has not committed itself on many major oil issues. Instead, the approach has largely been one of "let's take a good look at it."

This uncommitted stand, as on percentage de-

KENNEDY, in his administration so far, has not committed himself on many major oil issues. Attitude has been "Let's take a look at it."

pletion, causes some oil men to worry. But an offsetting factor is the fact that the Administration did not take office with a fixed, preconceived view on such issues.

All in all, the Administration seems to be aware that at the outset it had few in its top ranks who were authoritative on oil-related problems. Therefore, it has frequently turned to the industry itself for information and suggestions. One example: the public hearings earlier this year on the residual-fuel and crude-oil import-control programs.

This willingness to listen has been evident at other points, too.

Commerce Department listened to oil-field-equipment manufacturers and subsequently changed policies at the Import-Export Bank to permit government backing of loans made on purchases of U. S.-made drilling equipment sold abroad.

The Internal Revenue Service listened to producer spokesmen who objected vigorously to changes IRS was considering in the tax treatment of ABC-type sales of producing properties. As a result, it has resumed issuing rulings pending a further study.

The Federal Aviation Agency heard the protests of drilling contractors over a rule requiring notification to FAA of any structure 150 ft. high or higher. Some revision is now in prospect.

It is true that some administration officials, particularly in the Treasurery Department and at IRS, have taken pot shots at the industry from time to time. But to date this has seldom resulted in specific action.

Generally speaking, therefore, the oil man going to Washington can expect a polite, interested reception by most of the officials with whom he comes in contact. At this early stage, most of the officials are eager to get specific information and background data.

2. Interior Department

A "must" stop for an oil man visiting Washington is the block-long Department of Interior Building on C Street between Eighteenth and Nineteenth streets.

Here the oil man finds more men who can speak his language than at any other place in town.

Here is the hub of oil-related executive action which has a profound impact on the industry—oil import control administration, offshore leasing, oil-research projects, emergency planning, etc.

Policy makers. The top man, of course, is Stewart Udall, the Secretary of Interior. Udall is new to oil-industry problems, but he has evidenced from the outset an awareness of their magnitude.

Udall has made it clear that he expects Interior to be the top signal caller in government oil action, both domestic and foreign. He wants his department to be the natural place for the White House, other government departments, and Congress to turn to on matters pertaining to oil.

He has sought to offset his own lack of oil knowledge by selecting key assistants who have such knowledge.

The principal one of these is John M. Kelly, the assistant secretary for minerals.

It is evident that Udall is leaning heavily on this oil man from New Mexico to help him shape oil policy. And it is equally evident that Kelly is making a vigorous, aggressive effort to carry out his assignment.

Kelly feels strongly that the Administration has given the oil industry an ideal opportunity to present its case to Government through Interior. As a result, he is constantly urging industry officials to seize this opportunity by cooperating in every way possible to provide facts, ideas, and the manpower to translate programs into reality.

One of Kelly's more important roles is supervision of the work of the Oil Import Administration, headed by J. Cordell Moore.

Moore, a career government employe, is a newcomer to the oil picture, but has had a long-standing and active interest in the industry, stemming from his experience as a military petroleum supply officer. And his top assistant, Tom Snedeker, has worked on the control program from its very beginning.

Moore's shop has the responsibility of the day-to-day operation of the crude-oil and residual-fuel-oil control programs. Because of this intimate exposure to the problems involved, it is in a key position to make recommendations for changes and adjustments in control procedures. Thus, OIA is the starting point for

STEWART L. UDALL

JOHN M. KELLY

J. CORDELL MOORE

J. J. O'BRIEN

OIL AT INTERIOR: The key men handling oil-related problems at the Department of Interior are Secretary Stewart Udall, Assistant Secretary John M. Kelly, Oil Import Administrator J. Cordell Moore, and J. J. O'Brien, director of the Office of Oil and Gas.

"I have concluded, within the few short months that I have been in Washington, that the mineral leasing act, in the interest of optimum resource development, needs a complete revision; that a simple act, eliminating the present multitute of special conditions, would better promote orderly development of the public domain."

—John M. Kelly
Assistant Secretary of Interior

APPEAL BOARD: Eugene P. Foley, deputy assistant secretary of Commerce (for domestic affairs); D. Otis Beasley, administrative assistant to the Secretary of Interior, and Paul H. Riley, deputy assistant secretary of Defense (Installations and Logistics), make up the three-man Oil Import Appeal Board.

HEARINGS between Interior officials and oil men are frequently held. Here, independent producers map strategy for a hearing on further import restrictions.

the shaping up of the program as well as its actual administration.

The Oil Import Appeal Board is another facet of the control picture. This three-man board (see picture) hears appeals from companies seeking special relief. Under the present administration, the board seemingly has been given more authority to make exceptions than had the previous board, which turned down virtually every appeal.

But the import-control program is only one of many oil-related functions of Interior.

The Office of Oil and Gas serves as something of a clearing house for oil and gas matters, together with being a liaison with the military, State Department, and other government agencies.

One of its principal assignments is long-range and emergency planning.

The director is J. J. O'Brien, an oil producer and former oil-company official who once served a term as president of the Texas Independent Producers and Royalty Owners Association.

O'Brien's selection was further evidence of Interior's interest in selecting men with oil knowledge and background for key oil-related positions in the department.

There is an aggressive move under way at Interior to increase the stature and scope of OOG to make it an important factor in government oil circles.

The Bureau of Mines makes petroleum supply-demand forecasts (on which import allocations are based) and oil economic studies and reports (see table), together with research work in primary and secondary recovery, shale-oil processing, and natural-gas recovery and processing. Much of the research work is done in cooperation with various industry organizations.

There are also indications that it will expand its research work to include oil exploration and oil-well drilling.

R. A. Cattell is chief of the bureau's division of petroleum and Carl W. Kelly is staff advisor on technical aspects of utilization of petroleum products and production and use of petrochemicals.

C. J. Wilhelm is chief of the branch of petroleum research, and Donald S. Colby is chief of the branch of petroleum economics which compiles statistics on

The Bureau of Mines makes periodical oil-statistics reports and forecasts which are available to the industry. Here are some of the principal ones:

domestic and foreign crude oil, petroleum products, natural gas, and natural-gas liquids. This, too, is the branch that makes the economic studies and petroleum forecasts.

The bureau has petroleum research centers and laboratories at Bartlesville, Okla., Laramie, Wyo., Morgantown, W. Va., and San Francisco, and a petroleum field office at Dallas.

The Bureau of Land Management is the administrator of oil leases scattered over about 750 million acres of federal lands including submerged lands and privately owned lands in which the Government has retained mineral rights.

During the 1961 fiscal year, total income from these oil and gas leases amounted to nearly $117 million.

Top administrator for fuel and hard rock minerals in BLM is Jerry A. O'Callaghan, assistant director for lands and minerals.

Coordination and administration of oil and gas leases is the responsibility of the divisions of minerals which works directly with the various land offices in the field.

BLM land offices coordinate closely with regional offices of the Geological Survey for determination as to whether lands are on a known geological structure of producing oil and gas fields. The Director of Geological Survey is Thomas Nolan.

Under mineral-leasing laws, federal public lands on a known geological structure must be leased on a competitive basis, in size no larger than 640 acres. Competitive leases are for 5 years, with a royalty of not less than 12½%.

Noncompetitive leases are issued on lands not within known producing fields. These leases are for 10 years at annual rental rates of 50 cents an acre.

Except in Alaska, the acreage limit for noncompetitive leases and options is 246,000 acres in any one state, with no more than 200,000 acres under option.

In Alaska, there are two leasing districts, the acreage limit in each is 300,000 acres, with no more than 200,000 acres under option.

Other offices at Interior of interest to the industry include the Office of Saline Water, Bureau of Indian Affairs, and the Fish and Wildlife Service.

3. Justice Department

An oil man observed recently that, in effect, Lee Loevinger, antitrust chief at the Department of Justice, was a silent member of his company's board of directors.

After pondering a moment, the oil man added: "On second thought, he isn't very silent."

The point is that almost every move a company makes may be subject to scrutiny by the Justice Department or the Federal Trade Commission.

That includes mergers, marketing practices, prices, and a wide range of other activity.

All in all, aside from Interior with its import control programs, no department of the federal Government has the potential impact on oil industry operations equal to that of the Justice Department.

Consider, for example, the effect of the department's move into the marketing picture in the area that has been served by Standard Oil Co. of Kentucky under a products supply contract with Standard Oil Co. (N. J.).

The Justice Department ordered Kyso to end as quickly as possible its contract with Jersey Standard. And Justice then approved a merger of Kyso with Standard Oil Co. of California, thereby permitting that company to move into that region.

Other provisions added further emphasis to the impact (OGJ, June 12, p. 81).

There have been a number of other far-reaching

Petroleum statements (monthly) covering production, stocks, and demand for crude petroleum by states and districts; and production, stocks, demand, imports, and exports of oil products.

Petroleum forecasts (monthly) estimating national demand for crude oil.

Crude-oil stock reports (weekly) by grades and principal states, together with comparison with figures of previous week.

Natural-gas liquids (monthly) report on production, stocks, and demand of natural-gas liquids and liquified refinery gases.

Natural-gas reports (quarterly) on production, storage, and consumption of natural gas.

World petroleum statistics (quarterly and annually) on production, imports, and exports of crude oil; and production of refined products, country by country.

World retail prices and taxes (annually) on gasoline, kerosine, and lubricating oil in representative cities in various countries.

Petroleum refineries, including cracking plants, in the U.S. (annually).

Natural-gasoline and cycling plants in the U.S. (biennial).

Mineral yearbook, including chapters on oil, gas, products, and carbon black (annually).

Copies of these reports, except the yearbook, may be obtained from the Publications Distribution Section, Bureau of Mines, Washington 25, D. C.

The yearbook, or preprints of specific chapters of it, should be ordered from Superintendent of Documents, Government Printing Office, Washington 25, D. C.

California statistics may be obtained from Bureau of Mines, 420 Custom House, 555 Battery Street, San Francisco 11, Calif.

ATTORNEY GENERAL Robert F. Kennedy, who has asked FTC to check into 56 former antitrust cases to determine whether the defendants are "living up to the judgments against them."

LEE LOEVINGER, antitrust chief at the Department of Justice, who, with Robert Kennedy, has appeared before numerous congressional committees to plug for tighter, tougher antitrust provisions.

actions by the department in the short time since the Kennedy administration took over.

These are some of them:

Continental Oil Co. was charged with violating antimerger laws when it acquired Malco Refineries, Inc., of Roswell, N. M.

Suburban Gas, of Pomona, Calif., was faced with similar charges because of its acquisition of 59 liquefied-gas companies since 1948.

The sale of Honolulu Oil Corp. to Tidewater Oil Co. and Pan American Petroleum Corp. is also being challenged by Justice, although a court refused to issue an injunction barring the sale.

Seven corporations connected with the oil-well-servicing business have been charged with "unlawfully conspiring to restrain and monopolize trade by controlling patents on a wide used jet perforating process."

It is apparent that the present administration plans to continue to act as vigorously to block mergers as were President Eisenhower's antitrust officials.

Other moves at Justice have been significant, too. For instance, Atty. Gen. Robert F. Kennedy has ordered that all proposed consent judgments in antitrust cases will be made public at least 30 days before they are entered in court.

This will give anyone interested an opportunity to object to the proposed settlement, and it will leave Justice free to change the terms if it sees fit.

The attorney general has also asked the Federal Trade Commission to check into 56 former antitrust cases to determine whether the defendants are "living up to the judgments against them."

This move apparently stemmed from the suspicion that some firms found guilty of violating antitrust laws in the past may have continued or returned to the banned practice.

Attorney General Kennedy and Loevinger have also appeared before numerous congressional committees to plug for tighter, tougher antitrust provisions.

One of these is a proposed law which would require companies to give prior notice of mergers and acquisitions. Another would provide the department with the authority to issue subpenas in civil investigations.

A third bill also supported by Loevinger would require that inventions developed under government-subsidized research contracts would remain public property.

Before still another committee, Loevinger expressed dissatisfaction with oil-pipeline consent decree under the Elkins Act.

"Enforcement of the decree even as originally conceived would not reach the more serious antitrust problems inherent in refinery ownership of pipelines and the consequent monopoly position in crude-oil purchase the monopoly of the transportation system gives them," Loevinger said. "This we believe more important."

4. Treasury Department

Although an oil man may have little desire to visit it, the Treasury Department is the place in Washington, outside Congress, where tax policy is shaped.

Treasury has been assigned by the White House the task of drafting a major overhaul of the nation's tax

HISTORIC: This is the architect's sketch of the new Museum of History and Technology in Washington, D. C. There will be an oil-industry exhibit hall in this building when it is opened in 1963. The museum is a part of Smithsonian Institution.

structure. Indications now are that the work is proceeding slowly, and there is little likelihood that administration proposals on this will go to Congress before mid-1962, if then.

Meanwhile, Treasury will continue pressing Congress for action on some of the interim proposals submitted by President Kennedy earlier this year. Among other things, these include improving tax incentives for new plants and equipment and possible revisions of Schedule F listings of the depreciable life of various types of equipment.

Because of stepped-up spending, largely due to increased military readiness and the accelerated space program, pressure for tax increases is likely to develop. However, an effort will be made to stall such a move as long as possible, especially since next year is an election year.

Key policy men on tax matters at Treasury are Stanley Surrey, assistant secretary in charge of tax policy, and Harvey Brazer, head of the tax-analysis staff.

Mention of Surrey usually causes oil men to flinch, because Surrey has been an outspoken critic of oil's percentage depletion. However, there has been no indication yet that the administration plans any attack on this long-standing tax provision.

Internal Revenue Service, the tax-collecting branch of Treasury, is naturally an important agency to watch. This is particularly true because of increasing attention IRS has been giving to oil-related tax matters.

Mortimer Caplin, the commissioner of IRS, has also voiced disapproval of percentage depletion. He usually points out, however, that his is an administrative and not policy-making role.

Perhaps the most important single division in IRS relating to oil is the Natural Resources Branch of the Special Technical Services Division.

R. R. Stootsberry, until recently a member of the Dallas IRS office, heads the Natural Resources Branch, which does technical staff work on tax matters.

A number of oil-tax problems are under study by Stootsberry's staff.

ABC-type sales of producing properties have been under study since last spring, but no final decision had been made at the time this was being written.

Intangible drilling costs are also under scrutiny to decide whether they should be treated as capital expenditures or operational expenses for tax purposes. In offshore operations, platforms and islands are getting a particularly close look.

Section 614 regulations, which define property and its treatment for tax purposes, are not yet final, either, although they have been undergoing a great deal of analysis. The particular problem relates to a taxpayer's election to aggregate and treat as one property for tax purposes various separate interests and properties.

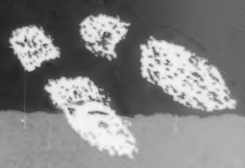
Miscible drives are also getting attention. The capital or expense issue applies here, with respect to costs incurred in injection. A decision on this one is expected soon.

5. Department of Commerce

The big, far-reaching Commerce Department provides statistical and other informational services to business and industry.

This includes market research studies, export-import regulations and licenses, foreign-investment

Most segments of the oil and gas and related industries have representation in Washington through trade association and other groups. They include the following:



American Gas Association, 1725 I Street, N.W.

American Petroleum Institute, 1625 K Street, N.W.

American Trucking Association, Inc., 1616 P Street, N.W.

Asphalt Institute, Asphalt Institute Building, College Park, Md.

Association of Oil Pipelines, 1725 K Street, N.W.

Chamber of Commerce of the United States, 1615 H Street, N.W.

Committee of American Tanker Owners, Inc., 1411 K Street, N.W.

Independent Fuel Oil marketers Association, 1625 K Street, N.W.

Independent Natural Gas Association of America, 918 16th Street, N.W.

Independent Petroleum Association of America, 1200 18th Street, N.W.

Independent Refiners Association of America, Shoreham Building.

Manufacturing Chemists' Association, Inc., 1825 Connecticut Avenue, N.W.

Mid-Continent Oil & Gas Association, 1625 K Street, N.W.

National Association of Manufacturers, World Center Building.

National Highway Users Conference, National Press Building.

National Oil Jobbers Council, 1001 Connecticut Avenue, N.W.

National Oil Marketers' Association, National Press Building.

National Petroleum Council, 1625 K Street, N.W.

National Petroleum Refiners Association, Munsey Building.

National Tank Truck Carriers, Inc., 1616 P Street, N.W.

Western Oil and Gas Association, 1700 K Street, N.W.

laws, and tips on business opportunities and how to exploit them.

Business and Defense Services Administration has priority and allocation authority for all industrial equipment in a national emergency. For oil, it would work through Interior Department in determining emergency needs and priorities.

An executive reserve of about 1,400 men, including oil officials, meets regularly to cope with simulated problems. The next meeting will be in December, on a regional basis. William C. Truppner is director of the Office of Industrial Mobilization.

The Agricultural, Construction, and Mining Equipment Division of BDSA annually publishes an oil-field-equipment and machinery-industry outlook and review, based on a company-by-company and plant-by-plant survey.

Bureau of the Census is a gold mine of statistics and information on a wide range of business and industries, including oil.

It publishes numerous statistical reports on the oil industry as well as foreign and domestic trade statistics, reports on export controls and licenses, and trade lists—domestic and foreign—for all major industry categories.

Census also publishes detailed data on exports of oil-field equipment and machinery, by commodity and country of destination, and a series on the Census of Mineral Industries: Crude Oil and Natural Gas; Natural Gas Liquids; Oil and Gas Field Services (well logging, surveying, cementing); Oil and Gas Field Exploration Services; Drilling Oil and Gas Wells Services Industry; Offshore Oil and Gas; Miscellaneous Oil and Gas Field Services; and Petroleum Refining and Related Industries in the Census of Manufacturers.

The Office of Business Economics issues two important publications of interest to the oil industry. One of these is the Survey of Current Business (monthly), which regularly carries statistical articles on such subjects as foreign-oil-industry investment by U. S. firms and foreign investment in the U. S. oil industry.

The other is the annual Business Statistics, a supplement to the Survey of Current Business.

The Commerce Business Daily publishes proposed government procurement, sales, and contract awards, and foreign trade leads.

The Bureau of International Business Operations and **the Bureau of International Programs** (the two replace the old Bureau of Foreign Commerce) provide a wide range of commercial intelligence on foreign countries.

This includes financial ratings on businesses and individuals, lists of trade and business opportunities, market-research information by commodity and country, information on competitive situations and legal requirements.

Foreign service dispatches on business subjects are regularly made available through the Commerce Department's 33 field offices.

The Bureau of International Business Operations also now has a "one-stop" service in Washington for anyone wanting to do business abroad. This is provided by the Trade Initiation Division.

Other agencies at Commerce which have some oil-

related functions include the Bureau of Public Roads, Maritime Administration, Federal Maritime Board, the National Bureau of Standards, Coast and Geodetic Survey, and the U. S. Patent Office.

6. State Department

There is little doubt that the Department of State is going to play a bigger and bigger oil role.

This will affect not only international operations but will have a direct bearing on many phases of the domestic industry. For instance, State has a hand in shaping the import-control programs because of the impact of these programs on Canada, Venezuela, and other oil-producing nations.

In more and more countries oil is becoming a vital economic or political issue, so that actions by the Government and U. S. firms get deeply involved.

The emergence of Russia into the world oil picture further complicates the situation.

And such issues as foreign-flag tankers vs. U. S.-flag tankers have repercussions over a widespread area.

Some oil observers feel that State Department has lagged in upgrading its offices and personnel who handle oil issues. As a result, they say, State hasn't spoken up often enough nor strongly enough on many occasions.

It should be borne in mind, however, that State does not operate on a commodity basis but rather, on a country or regional basis. Therefore, oil is handled as a part of a package of conditions in a given region, rather than being treated on its own.

For that reason, it is harder to put one's finger on a particular oil issue at State than it is at other government departments for several state divisions may be involved in one aspect or another.

At the working-staff level, State has a Fuels Division which handles many oil-related economic problems. Chief of this division is Hollis Kannenberg, who is well versed in oil but who may be subject to rotation because he is a foreign-service officer.

Earl Beckner, an advisor to the Office of International Resources, is another who assists with oil problems, as is C. W. Nichols, a special assistant to the assistant secretary for economic affairs.

7. Department of Defense

The current stepup in the nation's readiness program has made the military an even more important factor to the oil industry than it already had been.

This had already created the need for more military-industry planning, both to meet present needs and to prepare for future situations (OGJ, Oct. 30, p. 99).

Over-all policy and planning for oil are handled primarily through the office of the assistant secretary of Defense for installations and logistics.

At the procurement level, the Military Petroleum Supply Agency is the operating arm. It, therefore, is the military agency with which most oil men come in contact.

The director of MPSA is Rear Adm. T. L. Becknell, who last summer succeeded Rear Adm. O. P. Lattu.

MPSA also moved last summer to its new quarters at 801 Nineteenth Street.

8. Office of Emergency Planning

This agency, formerly the Office of Civil and Defense Mobilization, is involved at top planning level with various issues affecting the industry.

It has the power to certify, or decertify, to the White House the national security need for a particular oil-import-control program. Is is currently making a restudy of the residual-fuel-oil program.

It is also authorized by the President to maintain surveillance of prices of products under control, and now makes monthly reports on East Coast residual-fuel-oil price levels.

Another of its current studies is to determine whether there should be a special exemption for the asphaltic content of imported asphaltic crudes.

It is also charged with the responsibility for planning for economic controls, including prices and wages, should an emergency justify. Thus far, there has been no indication that it plans to recommend to Congress that standby price-wage authority be granted to the President.

The director of OEP is Frank B. Ellis.

The Courts: Where laws get legal tests

WHEN CONGRESS gets through with a piece of legislation and the executive branch of the Government puts it into effect, there is usually a third step before the action becomes final: a legal test in the courts.

The oil and gas industry is well aware of the power of the Supreme Court.

It was that court's ruling that started FPC regulation of independent-natural-gas-producer prices. Subsequently, the court insisted on cost consideration in producer price determinations.

Several cases involving FPC are still before the courts, including one pending in the Supreme Court over the merger of El Paso Natural Gas Co. and Pacific Northwest Pipeline Corp.

The Supreme Court's offshore boundary decisions have involved areas with potentials of billions of dollars of oil and gas.

Currently, the court has before it several oil-related cases, and many others are in the lower courts, wending their way up in many instances.

One being watched with particular interest is that of Standard Oil Co. (N. J.) against Interior's use of a sliding scale in determining import quotas based on refinery throughput. That case is pending in a U. S. District Court in Washington.

Numerous antitrust cases, most of them involving marketing and pricing practices, are also up for court disposition.

Regulatory agencies: FPC, FTC top list oil men should be familiar with

FROM TIME to time Congress has set up a regulatory agency to ride herd on some particular industry or activity.

These are called independent agencies even though they owe their birth and financial support to Congress and though the commission members are appointed by the President.

Independent or not, these agencies have a tremendous control over many areas of our economic system.

1. Federal Power Commission

The regulatory agency the oil and gas industry has to live closest with is the Federal Power Commission.

Its authority, spelled out by the Supreme Court in the 1954 Phillips' case decision, extends to the prices paid at the wellhead for natural gas moving into interstate commerce.

FPC is under new management now, made possible by the unusual opportunity President Kennedy had to appoint four new men to fill vacancies on the five-man commission. And the turnover will be complete when the President selects a successor to Commissioner Jerome Kuykendall, who will leave office January 1.

It has already become clearly evident that this new lineup is going to stir things up at that agency. It is far too early to gage what success it will have in bringing some rhyme and reason to the highly complicated problem of regulating natural-gas producers, but it is moving briskly to the task.

For the most part, these new commissioners took

FPC is under new management now. Turnover will be complete when a successor to Kuykendall, who will resign, is appointed

JOSEPH SWIDLER, FPC chairman

LAWRENCE J. O'CONNOR, commissioner

HOWARD MORGAN, commissioner

CHARLES R. ROSS, commissioner

JEROME KUYKENDALL, commissioner

office without fixed theories. So they are now in the shopping stage, with some hint of their direction just now beginning to emerge.

Some further indication of immediate moves ahead are expected when Chairman Joseph Swidler speaks at the American Petroleum Institute meeting in Chicago this week. (For earlier views expressed by Swidler, see OGJ, Sept. 25, p. 94, Oct. 30, p. 104.)

The commission is tackling the biggest of its problems—how to approach the regulatory task—by adopting the area-pricing approach formulated by the "old" commission last September. But it faces many tough decisions before that approach becomes clearcut.

Other Decisions Ahead

Meanwhile, there is no end of other decisions ahead.

For example, what changes should be made in area boundaries? (A hearing examiner last summer approved an initial price of 20.5 cents per M.c.f. on a sale of gas from Elk City field in Oklahoma even though the original price ceiling set by the FPC for that area was 15 cents. The examiner justified the higher price "because Elk City field is the most desirable single source of gas available in the United States today." Oral argument on the issue was held before the full commission early this month, and a decision is pending.)

What pricing action should be taken on in-place gas purchases by interstate pipeline companies? (One such case, the purchase of Rayne field, Louisiana, gas leases by Texas Eastern Transmission Corp., was sent back to FPC by the courts and was argued before the commission late last month.)

What should be done about cases now being decided by FPC examiners on a cost-of-service basis even though area-price ceilings have been specified by the commission for that area? (In at least two recent cases—involving Tidewater Oil Co. and Hunt Oil Co.—rate increases were denied after the cost-of-service method was applied.)

Should area prices be adjusted downward for gas that fails to meet "quality" standards set by FPC? (A proposed rule to this effect has brought sharp protests from the industry.)

The commission also has a proposed rule pending which provides for future rejection of any independent-producer natural-gas sales contracts containing indefinite price-escalation clauses, and any certificate applications by companies which rely upon these contracts as proof of available gas supply.

The deadline for comment by industry was set for November 13.

There is also a bitter fight under way in the Rock Springs pipeline case, in which El Paso Natural Gas Co. and Colorado Interstate Gas Co. are proposing to supply additional gas for markets in California while two Tennessee Gas Transmission Co. subsidiaries are offering a plan to supply gas purchased in Texas by Southern California Edison Co., to be transported from Texas through Mexico to California.

And final disposition is still ahead for the long-standing CATC case involving the sale of offshore gas. This case has been through the courts and back again to the commission, where an examiner made a second ruling in August. Commission action is pending.

In other words, the new commission has a long, long row to hoe. As one of the new commissioners put it wryly, it isn't very likely that the planned speedup in case handling poses any immediate threat to the livelihood of attorneys who specialize in gas cases.

2. Federal Trade Commission

As at the Federal Power Commission, there is already a new majority in charge at the Federal Trade Commission, which handles a variety of antitrust-law-enforcement activities.

Also like FPC, the new leaders at FTC are vigorously planning new methods and procedures aimed at speeding the regulatory processes and cutting down on the pileup of cases.

Unlike the new members at FPC, however, the new FTC commissioners are old hands at their work, and therefore are inclined to have definite ideas about what the FTC should do and how it should do it. The industry may not always be too happy with the result.

Of the three new FTC members, Chairman Rand Dixon and Commissioner Everette MacIntyre are old hands at FTC, having previously served there as staff members before moving into similar work with congressional committees handling antitrust matters.

The third new man, Commissioner Philip Elman, went to the commission from the Solicitor General's

IN A TYPICAL FPC HEARING, attentive gas men sat through 3 days of testimony at Midland, Tex. The hearing pictured here had to do with area gas pricing.

RAND DIXON, chairman of the Federal Trade Commission, is an old hand at FTC, having served as a staff member before his appointment.

office, where he had specialized in government prosecution of antitrust cases.

It already seems evident that the FTC will be militant in antitrust activities, and that the new men are likely to interpret FTC's role as a wide-cutting one.

Both Dixon and MacIntyre have talked of industry-wide attacks on illegal practices, rather than being content merely to file charges against a single company.

And MacIntyre has broached the possibility of the exercise of quasi-legislative power by FTC. That is, it would pass rules affecting an entire industry—what MacIntyre calls the wholesale approach.

Dixon stirred some oil-company officials with a speech he made last summer when he told the National Congress of Petroleum Retailers that "I can't help wondering what you could accomplish if you were independent owner-operators of your pumps rather than tenant-operators. It could be something which your landlords would not like to see happen. Perhaps some day you will become the owners."

Perhaps the tone of the FTC is best described by one of its own documents entitled "Introducing: The FTC," which is often handed to visitors who inquire about the FTC's role. The first two paragraphs follow:

"To protect the public from false advertising and scurrilous business methods and to preserve free and fair competition in the market place is the job of the Federal Trade Commission.

"It has the responsibility for policing a wider area of the American economy than any other government agency. Not only can it attack unfair business practices, but it has the power to proceed against practices that even threaten fair competition."

For oil men, one of the key offices at the FTC is the Division of General Trade Restraints, which polices gasoline-pricing practices. The chief of the division is Rufus E. Wilson, and he has some definite opinions on price differentials, area pricing, and sub-regular grades (OGJ, Oct. 23, p. 78).

All in all, it's a good bet that the industry, with its increasing battles in the market place, will be hearing further from Wilson and the FTC.

3. Other agencies

There are many other places in Washington's bureaucratic jungle where oil gets involved in one fashion or another. These include:

Small Business Administration, with its expanded loan program for small business (by SBA definition this includes many petroleum retail and wholesale operations, and even small refiners).

General Services Administration, which makes oil purchases for all government agencies except the military.

Department of Labor, which has a wide range of responsibilities relating to wage disputes and wages and hours, and which publishes a variety of statistics on wages, prices, and cost-of-living.

Department of Agriculture, which conducts research on farm use of specialized petroleum products and which reports data on farm oil consumption by product.

Federal Communications Commission, which controls the vast network of radio facilities used in all segments of the oil industry.

Department of Health, Education, and Welfare, which is becoming increasingly involved in air and stream-pollution-control studies.

National Archives, the custodian of all official government records dealing with oil and gas.

Bureau of the Budget, which reflects administration views on appropriations, and which approves questionnaires issued by other agencies, including questionnaires on oil and gas.

Library of Congress, which compiles data and makes special oil and gas studies for Congress.

Securities and Exchange Commission, where stock issues and other corporate actions are filed. SEC has an oil and gas unit which examines security issues involving oil royalties, lease holdings, etc.

Interstate Commerce Commission, which has certain regulatory authority over transportation systems. One recent hearing was an investigation of railroad rates of liquid petroleum gases in "jumbo" tank cars.

Tariff Commission exercises important authority under the trade agreements act.

Committee on Equal Employment Opportunity, set up to insure against discrimination in employment by companies with government contracts.

National Science Foundation directs scientific research work, including the Mohole Project.

Need more copies of the
"Oil man's guide to Washington"?

THIS REPORT—the most comprehensive ever to be made on oil in Washington—will be available in reprint form at $1 per copy.

You can order copies of the reprint by writing Reader Service Department, The Oil and Gas Journal, Box 1260, Tulsa.

How a petrochemical plant protects its large motor

Jefferson Chemical made sure protective and control devices were kept simple and had built-in safeguards.

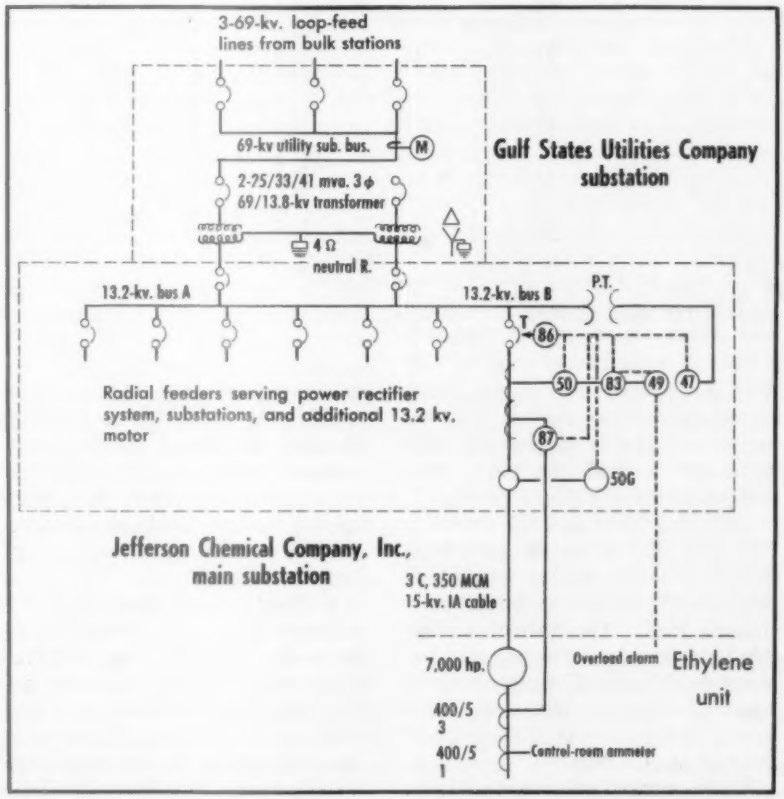
BY CLARENCE E. FISHER
Jefferson Chemical Co.

THE ELECTRIC MOTOR is becoming increasingly more popular in the petrochemical industry as a prime mover for large drive systems. This popularity is due to: (1) economics of installation and operating costs, (2) simplicity of operation, and (3) increasing reliability of the complete system (motor, auxiliary equipment, and service). The future, no doubt, will bring to us, as commonplace, even larger motors as prime movers which will dwarf our present so-called large motors.

(Purpose of this article is to provide a word picture of the application of a large motor in one petrochemical plant with the hope that some of the information given will assist someone in their considerations for similar applications.) The equipment discussed was designed in 1956 and 1957 and was installed and started up in 1958.

This discussion is divided into the following general categories:

1. Electrical system associated with large motor drive.
2. Operating and maintenance philosophy.
3. Application of protective relaying and control system to the drive.
   - (a) Control.
   - (b) Alarm and shutdown.
   - (c) Short-circuit protection.
   - (d) System voltage disturbance protection.
   - (e) Miscellaneous.
4. Summary.



PUBLIC-UTILITIES SERVICE and pertinent components of the distribution system serving Jefferson Chemical's 7,000-hp. motor. Fig. 1.

Electrical System

The large driver is a 7,000-hp., 1,185-r.p.m., 13,000-volt, 3-phase, across-the-line-starting induction motor. The full-voltage (13,000) starting current is 1,560 amp. The motor drives a centrifugal gas compressor through a speed increaser and is started with the compressor suction valves closed. It take 15 to 20 seconds on normal starting to come up to speed, depending on the system voltage and condition of compressor suction valves.

Prior to the plant expansion program in which the large motor was included, the plant electrical load consisted of about 2,000 kw., served at 2.4 kv. by a utility substation on a single 34.5-kv. line. Our present electrical system normally runs at a load of approximately 40,000 kw. This load consists of a rectifier system, large and small motor drives, and lighting.

Operation and Maintenance

Our operators are trained to operate a complex process unit to manufacture petrochemicals. The complexity of the unit is such that the operation of the motor must be regarded as a simple tool to accomplish a job. Therefore protective and control devices must be simple and have built-in safeguards.

The large motor is not spared and must run if the unit is to operate. The unit operates for a year with only a few days down at the end of the year for test and inspection. This means that the protection and control must be reliable.

As in most industrial plants, our electrical maintenance people have no relay specialists. Therefore, the equipment must be simple to test and easily repaired.

Application of relays and controls. A 15-kv., outdoor metal-clad

air circuit breaker, located in the switchgear line at the 13.2-kv. substation, serves as the large-motor starter. The motor is located some 800 feet distant and is served by a 3-conductor, 15-kv., 350-MCM-interlocked armored cable. Control and current transformer leads are carried in two steel conduits.

The motor is normally controlled by a start-stop switch on the control console at the motor. There is an emergency trip switch located in the unit control house. In addition to the mechanical trip at the circuit breaker, a switch is located on the circuit-breaker-relay panel to permit tripping the motor off the line. This switch serves also as a safety switch to remove starting control from the process unit for maintenance testing. The usual breaker-control switch can only be used with the breaker disconnected from the bus and in the test position. With this control arrangement, the motor can only be started from the console located at the drive; three locations permit shutdown; and the equipment can be tested for all relay functions with the breaker in the test position.

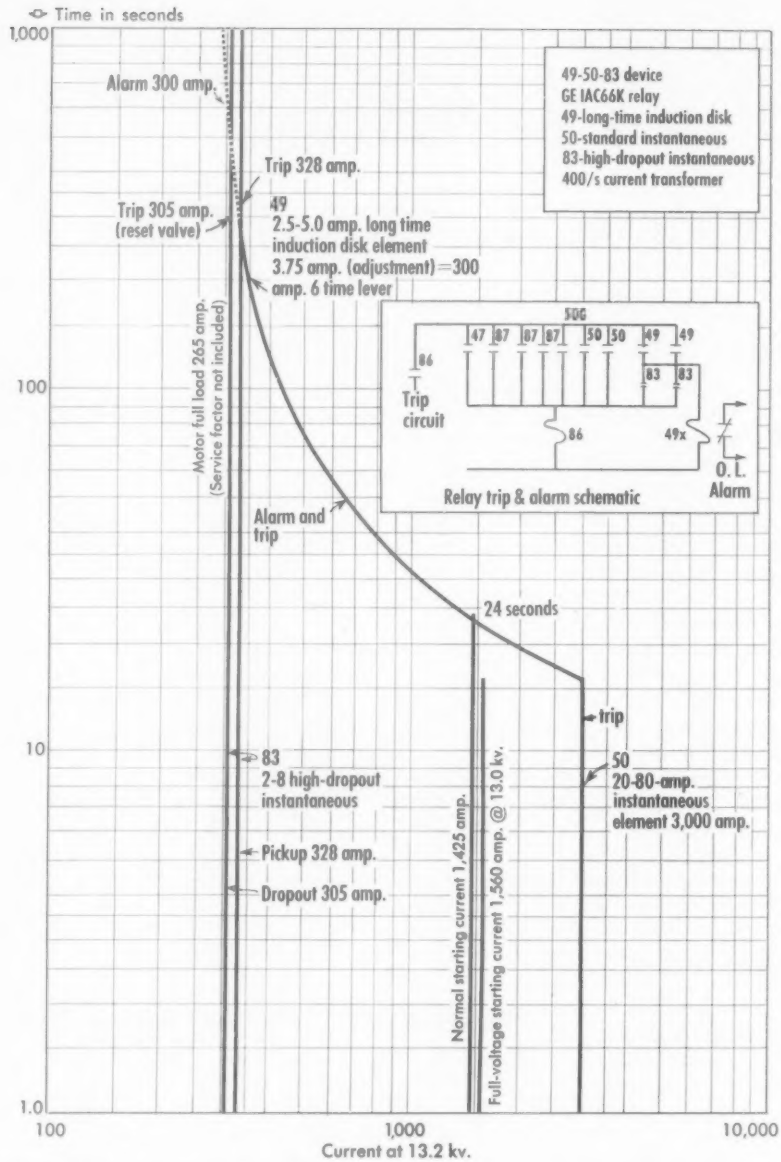
Recording and indicating instruments are provided in the control house. These consist of a recording ammeter which is necessary for process conditions, overload alarm annunciator, and a thermocouple scanner which monitors bearing and winding temperatures in addition to other process temperatures.

A shutdown, caused by protective relaying at the circuit breaker, requires the resetting of an 86 (electrically tripped-manually reset) switch at the substation. Conditions for allowing restarts after protective relay shutdowns are covered by specific instructions mounted on the circuit breaker relay panel.

The protective relay system for the motor consists of:

• **Overload alarm and shutdown.** GE type IAC66K relays are used for this function. This relay has an induction disk element with a very long time characteristic and two instantaneous elements. One of the instantaneous elements is a standard device (50) used for short circuit protection. The other instantaneous element is a special high dropout element (83) with adjustment from 80 to 90% dropout-to-pickup ratio.

The induction element (49) is used to actuate the overload alarm annunciator. The high-dropout instantaneous element is used in series with the induction disk element for overload shutdown. This composite curve is shown on Fig. 2.



PROTECTIVE RELAY CURVE for 7,000-hp. prime mover, including overload alarm and shutdown arrangement. Fig. 2.

Full load current of the motor is 265 amp. with a continuous service factor of 1.15, making a total of 305 amp. normal maximum continuous load. The induction disk overload alarm point is adjusted for alarm at 300 amp. The high-dropout overload shutdown element is adjusted for a pickup at 328 amp. and dropout at 305 amp.

Under normal starting conditions of approximately 1,425 amp., the motor will trip off the line in about 24 seconds if it fails to come up to speed. This setting for the induction element was arrived at from manufacturer's data on the equipment, plus field adjustment for actual starting time required and calculated starting current under various system conditions.

• **Short-circuit protection.** The primary short-circuit protection for the motor, including the cable feed, is provided by Westinghouse type CA percentage differential relays with a 10% setting. These relays are connected to current transformer windings which have no other burden on them and No. 8 wire in separate conduit serves the current

transformers located in the motor neutral.

Backup phase short-circuit protection is provided by the standard instantaneous elements in the IAC66K relays.

A neutral resistor in the utility company's service limits ground fault to 2,000 amp. Very sensitive ground-short-circuit protection for the motor is provided by a Westinghouse type ITH relay served by a donut-type current transformer, located at the cable termination in the circuit breaker. The donut transformer was used so we could obtain a very sensitive trip setting without fear of false tripping due to unbalanced relay burden or saturated current transformers during starting. Our present setting will obtain tripping at approximately 5 amp., phase to ground.

• **System distrubance protection.** A Westinghouse type CP reverse phase relay is used to protect against abnormal voltage conditions of balance and quantity.

• **Miscellaneous protection.** The equipment is shut down on high bearing temperatures or loss of auxiliary-oil circulating equipment.

There is no lightning or surge protective equipment installed on the motor. Jefferson Chemical's 13.2-kv. system consists of metal-clad switchgear with armored-cable service. However, the rectifier transformer system is housed in an open steel structure and is somewhat exposed. Station-type lightning arresters are used at this location. The utility company's 13.2-kv. bus is exposed but shielded in a steel structure and station-type arresters are installed on their buses. With this small incidence of exposure to the motors, we felt that lightning arresters at the motor would serve no practical purpose. In addition, a lightning-arrester installation at the motor would have required an expensive explosionproof housing since the area in which the motor operates is classified as a Class I, Division II, Group D hazardous area.

With the loop system of the utility company and associated substation, a system separation with high-speed restoration of service is extremely unlikely if not impossible. The service to the motor does not incorporate any high-speed reclosing devices. Therefore, we have not been concerned with extreme transient surges from this couse.

Summary. The installation has thus far been satisfactory. We had very little difficulty in putting theory into practice. We attribute this to full and interested cooperation between the utility company and the various contractors and manufacturers involved.

To summarize, a few significant factors previously discussed with additional comment follow:

• **Starting.** There was no trouble in determining the satisfactory voltage and current levels during starting. This is a routine item which can be accurately calculated when all parameters of the problem are considered. During starting of the large motor, the normal 13.2-kv. bus voltage drops to approximately 90%.

In planning any large motor application for an industrial plant where it is determined that voltage during starting conditions will be marginal, the engineer should be very careful in rationalizing that "the electrical disturbance can be endured since starting will be very seldom." As an example, the theoretical starting rate on the large motor described in this paper is once each year compared with approximately 30 actual starts in less than 3 years of operation. Although the majority of these starts occurred during the initial startup and run-in period of the process unit, marginal voltage conditions causing electrical (and therefore process) disturbances, would have created an almost intolerable situation in our total plant production operations.

The data provided by the equipment manufacturer on the starting time required is usually accurate for the conditions specified. On the installation under discussion, it was necessary to slightly extend the time allowed for overload tripout on starting. This apparently was principally due to the practical inability to completely unload the machine during starting.

• **Overload alarm and shutdown.** The overload alarm and shutdown arrangement for the motor as shown on Fig. 2, supplemented by a control-room ammeter and winding temperature alarm, provides the protection and flexibility required for this type of operation. For important large process motor applications, some periodicals recommend the minimum shutdown value of 1.5 to 3.0 times full-load current of the motor. To the writer, this did not appear practical. As shown on Fig. 2, the minimum trip is held as close as practical to the full load capability of the motor and still leave sufficient margin above the normal load current to provide for protective relay setting inaccuracies.

Should future changes in operations require use of the motor's continuous service factor of 1.15, the overload alarm and shutdown scheme would probably be revised as follows:

1. Provide instantaneous alarm at a value of current slightly above normal load using the high-dropout instantaneous element of the IAC66K relay. A push button with an auxiliary relay whose contacts would shunt the current coil of the instantaneous element would allow resetting the instantaneous element for conditions where a return to normal current would still be higher than the coil reset value.

2. The time-current element of the IAC66K relay would be used separately for overload tripping. The minimum trip setting would be made above the instantaneous alarm element only to the point where no overlap could exist due to relay setting inaccuracies.

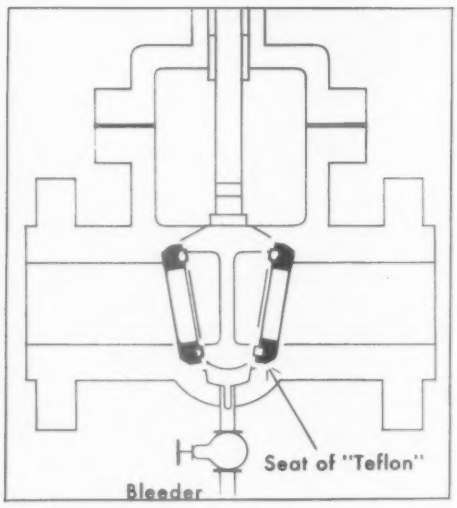
The above proposed arrangement would provide immediate notification of an overload condition to the process operator with some time allowed for corrective measures before shutdown; and the motor would still be provided with adequate overload shutdown protection.

• **Short-circuit protection.** The high cost and process importance of the large motor coupled with a high three-phase short-circuit capability in excess of 400 mva. made the use of a fast differential relay imperative for this application.

The use of the donut-type current transformer which detects actual zero sequence current only has allowed a very low instantaneous ground fault setting without fear of false tripping.

• **Interlock system.** The interlock control system used provides simplicity of operation, equipment protection against undesired attempts of restarting, and maintenance safety and simplicity for testing.

SINGLE BLOCK VALVE uses soft seals to assure positive segregation of fluids.



SINGLE SOFT-SEAT gate valve, using seat of Teflon guarantees zero leakage.

Soft-seal valves simplify piping systems

SUBSTITUTING single soft-seat gate valves for the "double block-and-bleed" valve system conventionally used in refineries can lead to substantial savings, Esso Research & Engineering Co. has found.

After a 4-year investigation, its engineers are recommending this type of valve for piping systems in refineries of affiliated companies throughout the world. Elimination of one block valve, plus other equipment savings, can reduce costs as much as 45%, it was found.

Currently Esso Research specifies single soft-seal gate valves, in sizes 2 in. or larger, for temperatures up to 450° F. in the 150-psi. rating. Studies are now being made toward possible acceptance of soft-seal valves in the 300-psi. rating.

Historically, conventional gate valves have been considered as capable of sealing only on the downstream side of the gate. To compensate, designers automatically incorporated the double-block-and-bleed design into manifolding systems and other process piping where zero leakage was a design prerequisite.

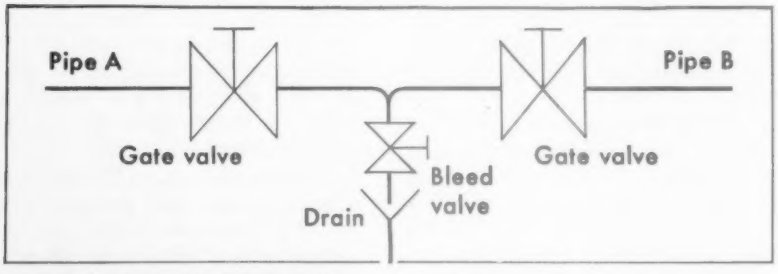
In this system two gate valves are positioned back-to-back, with a small bleed valve between them (see diagram). Such a hookup does not insure against the effects of leakage across a single closed valve. But if leakage does occur across either of the two valves, the fluid can be removed via the bleed valve between them. Thus with both valves closed and the bleed valve open, positive segregation is definitely assured.

Availability of Teflon, and similar soft nonmetallic, chemically resistant, high-temperature materials, has made it possible to assure positive fluid segregation with a single valve.

In new gate valves called for by Esso Research specifications, two supplementary soft-seal rings are fitted into grooves machined into either the body seat rings or gate. Closing the gate slightly compresses the soft seals to provide both upstream and downstream tightness. The small bleeder valve beneath the valve body (see diagram) gives the same assurance of positive shutoff as did the bleed valve in the double-block system.

In its investigations, Esso Research found that a 150-psi. gate valve fitted with soft seals would provide upstream tightness at the valve's cold-rated pressure of 275 psi. More recently, it proved the new valves were firesafe. The closed valve would not leak when subjected to fire, thus preventing the flow of product to a source of ignition downstream.

Acknowledgment: Based on material from Du Pont's "Journal of Teflon," November 1961.



DOUBLE BLOCK-AND-BLEED SYSTEM usually used in processes where zero leakage is requisite.

Dow building major petrochemical installation

A THREE-PHASE program is under way to transform Dow Chemical Co.'s Bay City, Mich., plant into one of the country's major petrochemical installations.

First phase is a multimillion-dollar construction project at Aurora Gasoline Co.'s Detroit refinery. Three new suits and a revamped existing one will produce 20 million gallons of benzene and toluene for Dow's Bay City plant. A 42-mile, $1.7-million extension of Buckeye Pipeline Co.'s line, from Flint to Bay City, will provide for pipeline transportation of these petrochemicals from Detroit to Bay City.

A new Hydeal unit is being constructed at the Dow plant to convert the incoming toluene to benzene.

Aurora facilities. The new units at the Aurora refinery are (1) a 10,000-bbl. per stream day Platformer, (2) a Udex extraction unit for recovery of high-purity benzene, toluene, and xylenes from the reformate, and (3) a 2,200-bbl. high-pressure Unifining unit for desulfurization of selected feed stocks for the Platformer. An existing Unifining unit will also be revamped for this service.

The two Unifiners will pretreat straightrun naphtha and thermally cracked and fluid-coker naphtha. The desulfurized, fractionated naphtha will be used as feed stock for the new BTX Platformer and an existing motor-fuel Platformer.

A high-purity benzene and toluene mixture from the new units will be transferred to Dow via pipeline, thus overcoming freezing problems. The benzene-toluene mixture remains liquid down to −50 °F., while pure benzene freezes at about 40 °F.

At the Dow plant, benzene from Aurora and from the Hydeal unit will be further processed into a number of petrochemical products.

All facilities are scheduled for completion by the middle of 1962. Construction of the Aurora units and of the Dow Hydeal unit will be done by Procon, Inc.

Calco and Oxo projects progressing on schedule

A 300-TON per day anhydrous ammonia plant is now on stream at Fort Madison, Iowa.

The new plant, one of the biggest grass-roots investments made in the fertilizer business in recent years, is operated by the ORTHO division of California Chemical Co., a subsidiary of Standard Oil Co. of California. It is the company's first plant in this part of the country.

The ammonia plant is one of four units going into the $22-million fertilizer complex. Later this year a 250-ton nitric acid plant will be completed, along with a 150-ton prilled ammonum nitrate plant and a 600-ton plant to turn out pelleted plant foods. Natural gas will be the feed stock for the ammonia plant.

Bechtel Corp. is building the Fort Madison complex.

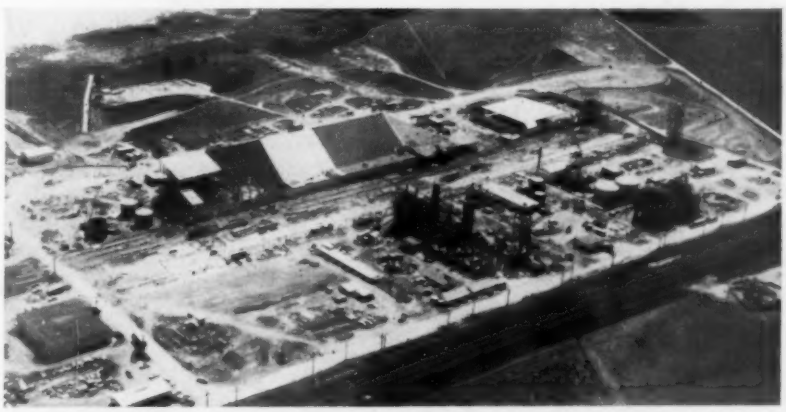
Oxo construction now about 15% complete

A NEW industrial-alcohol plant is under construction at Haverhill, Ohio, by Oxo Chemicals Co., a jointly owned subsidiary of Amoco Chemicals Corp. and Pittsburgh Chemical Co. Construction is now about 15% complete.

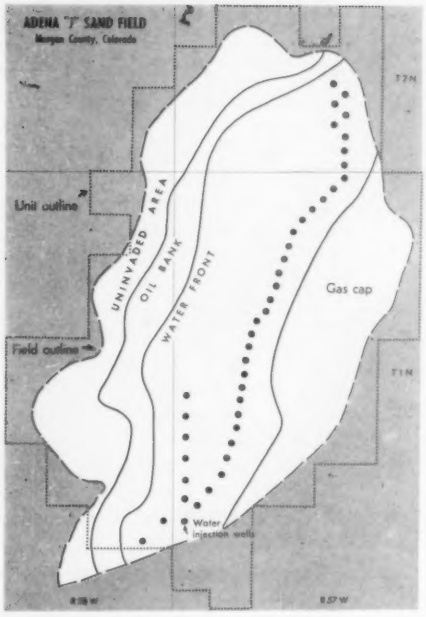
A critical-path study by the contractor indicates early 1962 as the plant completion date. About 90% of the engineering work has been completed, and about the same per cent of the purchasing is committed. Railroad spurs are in, the dock structure on the Ohio River is complete, and about 90% of the foundations in the process area have been poured.

Starting with olefins, the plant will manufacture isooctyl and decyl alcohols by the oxo process.

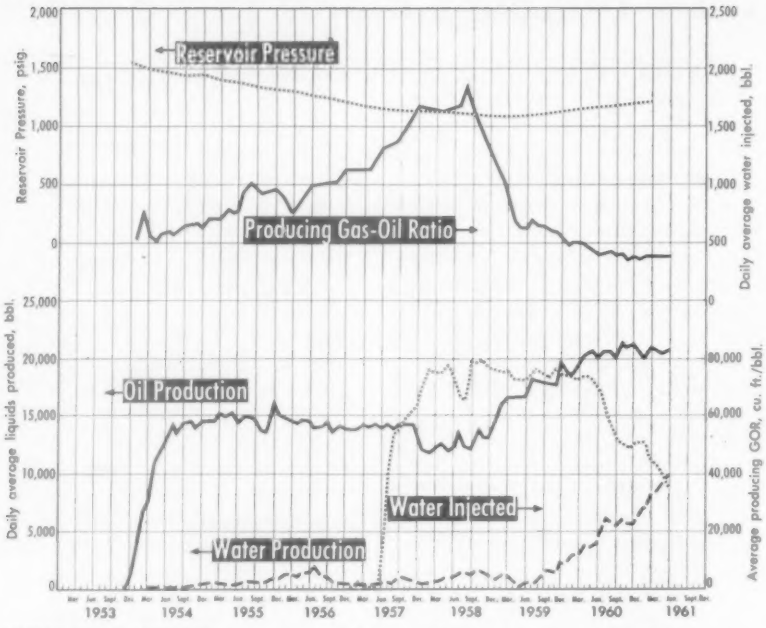
Fluor Corp. is the general contractor.



CALCO AMMONIA PLANT, above, is now in production. Oxo Chemicals Co. industrial alcohol plant, below, will use olefin feed stocks.



WATER INJECTION in the row of wells along Adena's original gas-oil contact has moved oil down dip into an oil bank. Performance has been as good as or better than expected.



ADENA FIELD HISTORY is shown by these performance curves. Producing gas-oil ratio began climbing in a manner typical of solution gas drive fields before water injection started. Note the rapid decline in produced gas-oil ratio and the increase in oil production rate after injection got under way.

Adena gas-oil-contact water injection

BY A. T. SAYRE
Supervisor, Reservoir Engineering, Denver,
AND W. C. BARTON, JR.
Superintendent, Adena District, Fort Morgan, Colo., Pure Oil Co.

WATER INJECTION along the gas-oil contact in Adena field, Colorado, was started in July 1957.

Reason for this unusual procedure was the extent of the gas cap, and the fact that the dip in the field was only 48 ft. per mile. Depletion mechanism under primary operations would be solution-gas drive in combination with gas-cap expansion. Efficiency of this drive would be low, and production throughout the life of the field would be at high gas-oil ratios.

Under these conditions it was recognized that unitization was needed, and the field would have to be operated under some form of pressure maintenance. The Adena "J" sand unit was formed on January 1956, about 2 years after discovery, with Pure Oil Co. as unit operator.

The reservoir. Adena field is located about 12 miles south of Fort Morgan in Morgan County, Colorado. This large stratigraphic trap was discovered in 1953, and development by drilling 170 oil wells and 15 gas wells was completed by mid-1954. Average depth to the Dakota "J" sand is 5,650 ft. The field is approximately 7 miles long and 3.5 miles wide, and the 8,425-acre oil zone is overlain by a gas cap of approximately 4,650 acres.

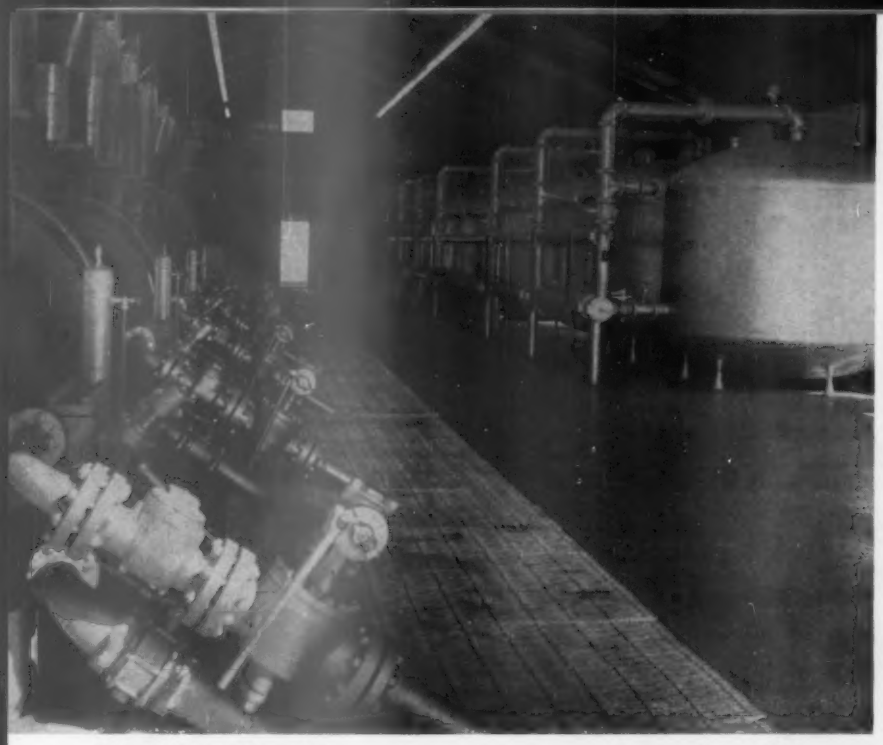
Hydrocarbon accumulation lies in a formation which dips westward at a rate of 48 ft. per mile and is confined by permeability barriers along the east edge of the gas cap and an oil-water contact to the west.

Average thickness is 30 ft., porosity is 19.7%, and permeability is 356 md.

Reservoir oil was originally saturated with 526 s.c.f. per bbl. of solution gas at 1,541 psig. Stock-tank-crude gravity averages 43.4° API and the oil under reservoir conditions has a viscosity of 0.35 cp.

Problem studied. Reservoir-performance calculations and laboratory studies performed by the unit operator investigating various pressure-maintenance methods showed that a water-injection program would result in the greatest economic recovery. These studies further indicated that due to the large gas-oil contact area and reservoir dip of only ½°, oil would migrate into the dry gas cap with downdip water injection. Reservoir and laboratory studies showed that injection along the gas-oil contact was feasible and would result in maximum ultimate oil and gas recovery. Water-injection facilities were installed, and full-scale injection into 30 wells along the gas-oil contact was started on July 1, 1957.

Primary production for 3½ years prior to water injection resulted in gas-cap expansion across the top of approximately 75% of the oil reservoir. Gas-oil ratios increased rapidly in this area and some wells were shut in to minimize reservoir withdrawals. During this time the fluid-withdrawal rates were restricted by state regulations and total field production did not exceed 14,000 bbl. per day.



WATER-INJECTION PUMPS are triplexes driven by 115-hp. single-cylinder gas engines. These 10 pumps discharge water at 630 psig. into a 12-in. line for distribution to injection wells in the field. Supply water and produced water are commingled, chlorinated, and fed through the filters at right before injection.

Low oil recovery by primary depletion expected to climb to 55% before abandonment. And there is the additional benefit of a shorter producing life.

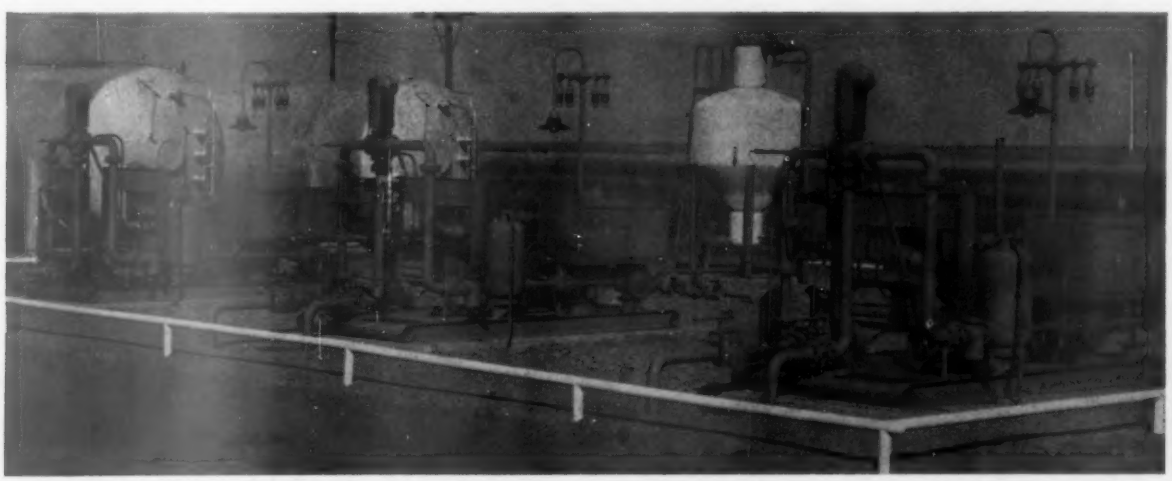
is fulfilling its promise

Immediately prior to water injection the bottom-hole pressure had declined 390 psi., and the field average gas-oil ratio was 1,375 cu. ft. per bbl. Individual well performance showed the GOR to be increasing at a rate of approximately 100 cu. ft. per bbl. per month. Oil-production rates had been reduced to 12,000 bbl. per day to reduce produced gas volumes in months directly following initial water injection.

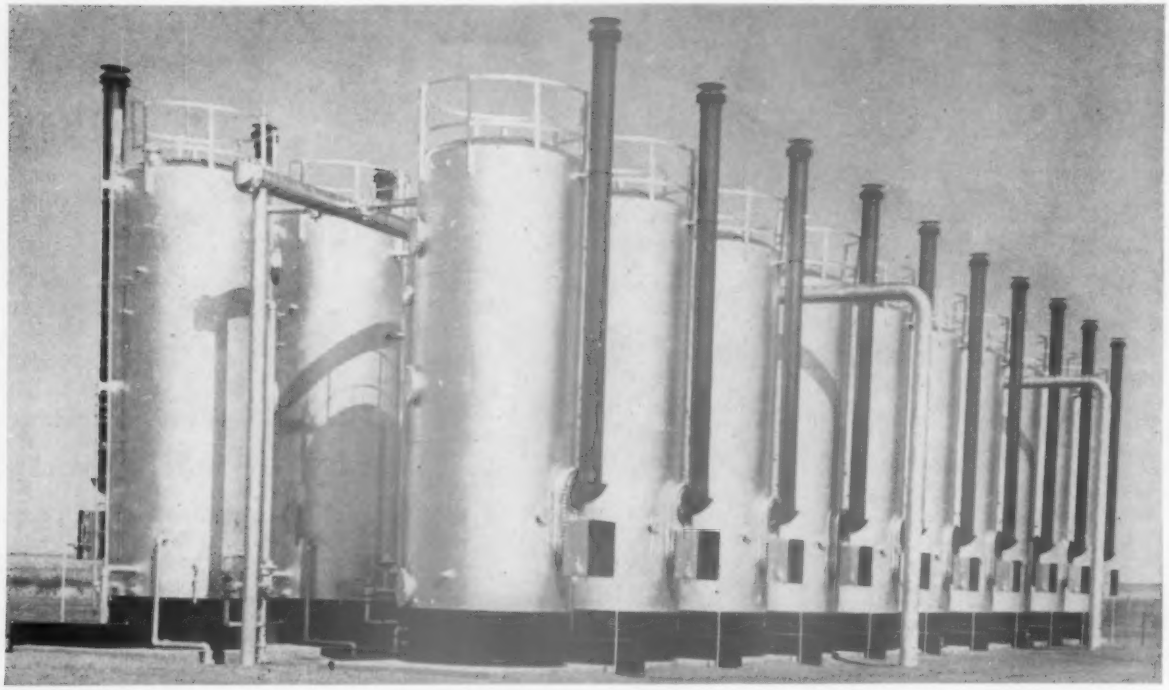
Initial water-injection rate was 40,000 bbl. per day and was increased within 6 months to approximately 75,000 bbl. per day. This was done to replace the oil and gas withdrawals from the reservoir which continued to increase until the oil bank was formed. Individual water-well injection rates were adjusted to obtain uniform movement of the oil bank across the reservoir. Interference between water-injection wells occurred in November 1957, after which the gas-cap pressure started to increase at a rate of approximately 15 psi. per month.

By January 1958 an oil bank had been formed and was moving into the high-gas-oil-ratio area of the oil zone. When the oil bank moved to a previously high-ratio well, gas-production rate declined rapidly to essentially solution ratio.

Production was continued from



AUTOMATIC-CUSTODY-TRANSFER UNITS handle production from Adena. These three-skid mounted units are fed by the two surge tanks on the left. Prover tank, background, is used to calibrate the sales meters.



CENTRAL TREATING FACILITY is fed by a common gathering line that ties into eight header stations. Water from these 20 heater treaters goes to an earthen pit where it is picked up by the pumps for reinjection.

these wells until water breakthrough occurred. Increase in water-oil ratio was very rapid and wells were shut in at 50% water cut. Pumping units were moved ahead to new oil-bank wells to permit rapid movement of the oil bank across the reservoir. Continued "stripping," or high-water-oil-ratio production, behind the oil bank would have resulted in deterioration and reduction in size of the bank.

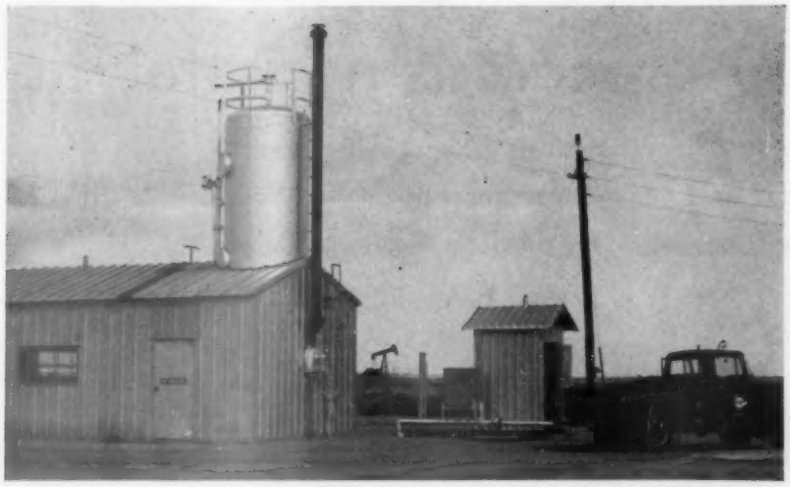
Oil bank grows. The oil bank grew to a width of approximately two well locations, and has maintained this width as it moves across the reservoir. Wells in the area ahead of the oil bank, the uninvaded zone, were tested each month and only the lowest gas-oil-ratio wells were considered for production. Oil-production rates from the oil bank and uninvaded zones in the reservoir were determined each month by calculating the effective water movement toward the oil zone to replace withdrawals. This was accomplished by calculating, from pressure observations, the volumes of water required to (1) cause the pressure increases in the gas cap, and (2) occupy the space due to the compression and solubility of the trapped gas in the water-invaded zone. From oil-bank withdrawals, the rate of movement of the oil bank into the uninvaded zone was established. Production from this zone was then curtailed from the lowest ratio wells to an equivalent reservoir voidage which allowed pressure maintenance and prevented unnecessary shrinkage. As the width of the oil bank increased, production rate from it increased from 1,000 bbl. per day to approximately 20,000 bbl. per day. This has been relatively constant for the last 6 months. Gas-oil ratio from this zone has declined from 1,000 cu. ft. per bbl. to 370 cu. ft. per bbl., or essentially solution ratio.

Oil-production rate from the uninvaded zone has been reduced from 9,000 to 1,000 bbl. per day as production rate from the oil bank has increased. Gas-oil ratio has been reduced from 1,800 to 500 due to restricted withdrawals and a slight buildup in reservoir pressure. Gas-cap pressure has increased from 1,210 psig. to 2,050 psig. and has now leveled off.

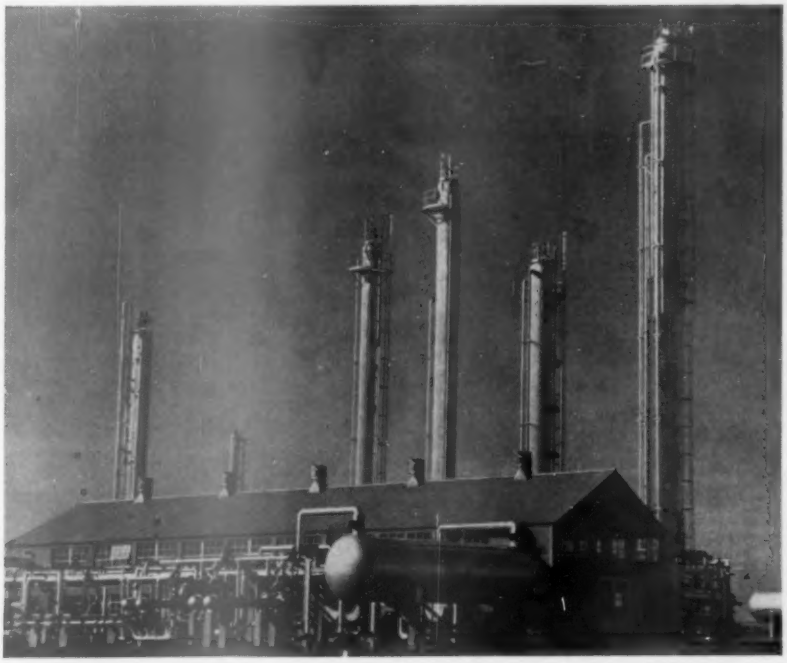
Performance good. Over-all field performance to June 1, 1961, has shown a continued capability of producing reservoir oil at essentially solution ratio. Currently, 20,644 bbl. of oil per day is being produced from the oil bank and uninvaded zone at an average GOR of 371 cu. ft. per bbl. Because of reduced reservoir withdrawals, water-injection rate has been cut from 75,000 to 35,400 bbl. per day. Less water is moving to the gas cap but it has not affected the width or rate of movement of the oil bank. The oil bank has moved across the reservoir in a fairly uniform band except in isolated areas in the north and south ends, where reservoir characteristics vary. This has required the movement of the injection wells toward the oil bank in these areas.

Cumulative production to June 1961 is 41,471,294 stock-tank barrels, of which 25,824,202 has been recovered since start of the injection program. This is equivalent to 35.9 and 22.4% of the revised original oil in place, respectively. Oil-bank production of 15,140,259 stock-tank barrels or 13.2% of original oil in place has been at essentially solution gas-oil ratio. Cumulative water injection is 96,177,120 bbl. and cumulative produced water is 5 042,322 bbl.

The oil bank has almost moved across the reservoir, and pumping units have now been moved to the last three rows of producing wells along the west flank. These wells will be produced until they reach



ONE OF EIGHT automatic header stations conveniently located in Adena field. Installation includes a test treater and test gas meter run. Oil and water from this station are commingled with output of other stations and sent to the central treating facility. Gas is separated out here and sent to the . . .



ADENA GASOLINE PLANT. This plant is fed by the field gas-gathering system.

their abandonment water-oil ratio.

The gas cap has been shut in all this time to minimize water losses. Presence of a large water bank between the gas-cap and oil-bank zones will now allow gas-cap production without incurring losses to the over-all program.

Automation. Producing facilities were automated in 1958. Produced fluids are gathered through individual lead lines to eight automatic header stations where gas is separated from oil and water and enters the Adena gasoline-plant gathering system. Oil and water flow through line heaters into a common gathering line which is connected to a central treating facility. A test treater is installed at each station to provide automatic sequence testing of each well. High-level and pressure shut-in devices provide safe operation with a minimum of supervision.

Central treating consists of 20 heater-treaters operating in parallel which separate the water from the oil. Produced water is picked up from an earthen pit and reinjected. Oil enters two surge tanks which feed three skid-mounted ACT units. Positive-displacement meters measure the oil while temperature and b.s and w. monitors maintain quality control. A prover tank is installed for periodic calibration of the sale meters.

Injection equipment. Water-injection facilities include ten 115-hp. single-cylinder gas engines connected to triplex pumps. The supply and produced waters are commingled, chlorinated, and filtered prior to injection. Discharging at a pressure of 630 psig., the water is distributed through a 12-in. line to the injection wells. Reduction in producing gas-oil ratios of oil-bank wells required the installation of artificial-lift equipment as wells ceased flowing.

Performance of the Adena reservoir to date shows that water injection along the gas-oil contact as a pressure-maintenance program is performing satisfactorily.

The gas cap has been effectively separated from the oil zone, allowing oil production at essentially solution gas-oil ratio. As a result of this low producing ratio, total reservoir withdrawals have been reduced and oil-production rates increased over and above that which could have been attained under primary operations. Original reservoir studies showed less than 30% of the original oil in place would have been recovered through primary pressure depletion. As a result of the pressure-maintenance program, an ultimate recovery of 55% of the oil in place is expected when the economic limit is reached. Further economic advantage is anticipated as a result of reduced operating life. The injection program has also prevented large losses in recoverable oil due to migration into the dry gas cap. This would have occurred under any other injection program.

It is concluded that gas-oil-contact injection offers advantages as a means of pressure maintenance in a low-relief reservoir containing a low-viscosity crude and overlain by a large gas cap. Unitization and initiation of pressure maintenance during its early life have enhanced the ultimate economic recovery from the "J" sand reservoir in Adena field.

Gulf's new THD process is noncatalytic

High product yields and freedom from coking problems in the reaction zone are principal features of new thermal hydrodealkylation process for producing benzene and naphthalene

BY O. H. STORMONT
Refining Editor

LABELED the Gulf THD process, the noncatalytic method results in better than 95% of theoretical yield of high-purity benzene from toluene charge stock. Benzene also can be obtained from xylenes, other alkyl benzenes, and reformate bottoms.

Naphthalene can be produced from reformate bottoms, light catalytic gas oil, extracts, and coal-tar fractions. If desired, both benzene and naphthalene can be made by proper selection of charge stocks. Yield of naphthalene depends primarily upon the concentration of naphthalene rings in the charge stock.

Developed by Gulf Research & Development Co., no commercial THD units have been constructed. However, three plants are now in the design stage.

Pilot studies. Work on the THD process started some 5 years ago, when Gulf researchers were concerned with eliminating the "dirty-burning tailends" from gasoline stocks.

Experiments proved that a simple thermal process, in the presence of hydrogen, is a highly efficient method for removing a methyl group from an aromatic nucleus. Under these thermal conditions, they found there were virtually no side reactions, the reaction was remarkably coke-free, and that the aromatic structure was preserved.

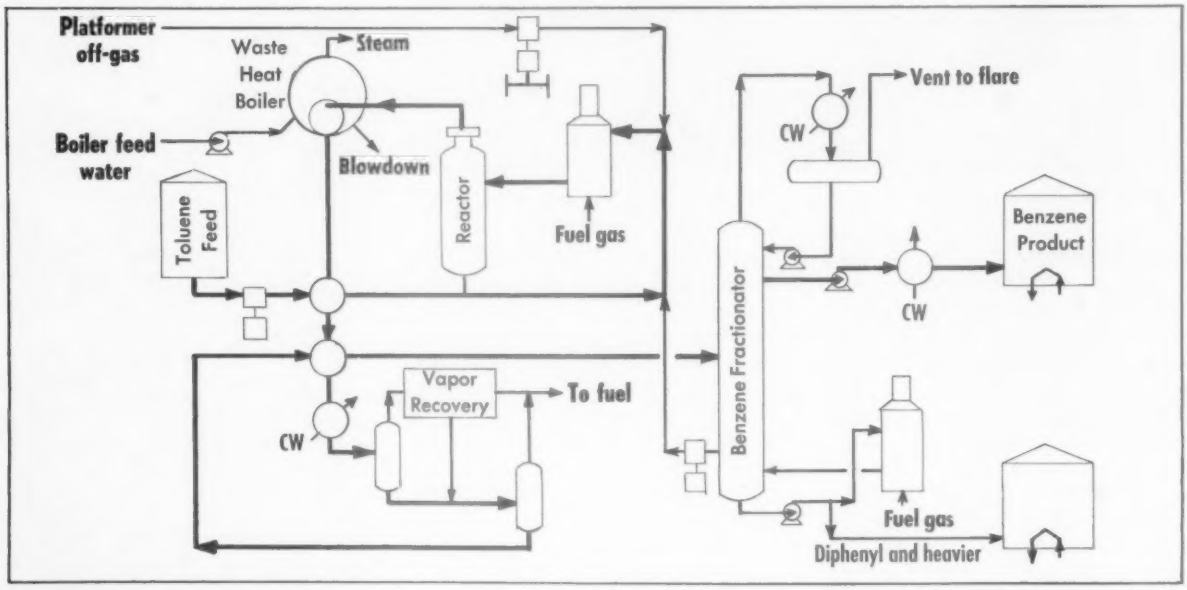
Process flow is shown in the accompanying diagram. Nitration-grade toluene is charged to the heater, along with hydrogen from naphtha reforming or gas reforming. From the heater the stream passes directly to an especially designed reactor. There conversion is carried out at elevated temperatures and moderate pressures.

Reactor effluent goes to a waste-heat boiler where it's used to generate high-pressure steam. Product from the boiler is heat exchanged with fresh toluene, cooled, and the gas and liquid then separated. Liquid product goes to a fractionator where pure benzene is then recovered.

Unconverted toluene is recycled to the furnace. Bottoms from the fractionator, amounting to about 1% of the charge, are either reheated and circulated to the fractionator, or are withdrawn to storage.

Benzene produced from nitration-grade toluene will have a 5.39° C. (42° F. approximate) minimum solidification point, contain less than 1 p.p.m. of thiopene, and have a maximum acid wash color of 2, according to Gulf Research.

Investment costs for a plant charging 1,000 bbl. per day of high-purity petroleum-derived toluene, using a byproduct hydrogen steam, will amount to about $1.2 million.

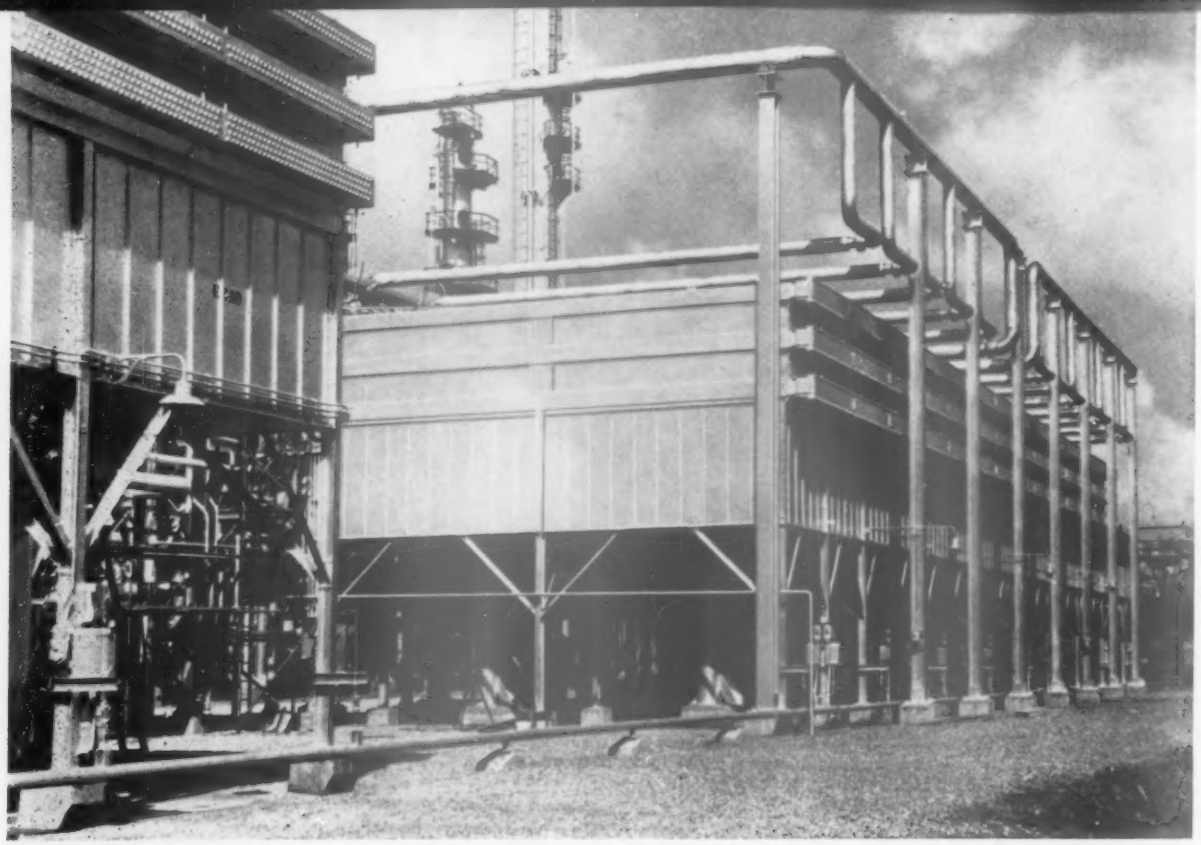


THERMAL HYDRODEALKYLATION PROCESS developed by Gulf converts toluene to benzene, with yield more than 95% of theoretical.

itch: No progressive company is without it. It's that sometimes annoying, but always rewarding, attitude that there may be, just *may* be, a better way to do something. Just beyond the next test tube, there may be a better product; just beyond the present procedure, a faster or safer or more economical one. We encourage this kind of itch at Ethyl. We have for 38 years.

ETHYL CHEMICALS ETHYL CORPORATION

ETHYL CORPORATION, NEW YORK 17, N. Y. • TULSA • CHICAGO • HOUSTON • LOS ANGELES • ETHYL CORPORATION OF CANADA LIMITED, TORONTO.



CRUDE-BOTTOMS COOLER at the Milford Haven refinery of Esso Petroleum, Ltd., is thought to be the world's largest single air-cooled heat exchanger. Fig. 1.

The case for air-cooled exchangers

—they get the job done, but they pose control problems

PART 1 OF TWO PARTS

BY J. C. CHRISTMAN
Design Engineer
Griscom-Russell Co.
Massillon, Ohio

AIR-COOLING has been used in the Southwest successfully for about 20 years for such duties as jacket water, lube-oil coolers, and for natural-gas coolers at compressor stations. However, it has been relatively recently that refinery engineers and operators have installed air-cooled exchangers for their process services.

The reasons for changing to air are basically twofold: First, a lack of adequate cooling water and, secondly, a lower over-all cost consisting of a combination of lower installation and lower operating costs.

The use of air has not been without its problems. But it is an established fact that the air cooler can perform the desired cooling duties during the warmest of weather. However, controlling the outlet temperatures of certain fluids during adverse weather conditions has not been without a great deal of trial and error both on the part of the user and the manufacturer.

Crude-bottoms cooler. Probably the most difficult of all cooling duties performed by the air cooler is the viscous-oil or crude-bottoms cooler.

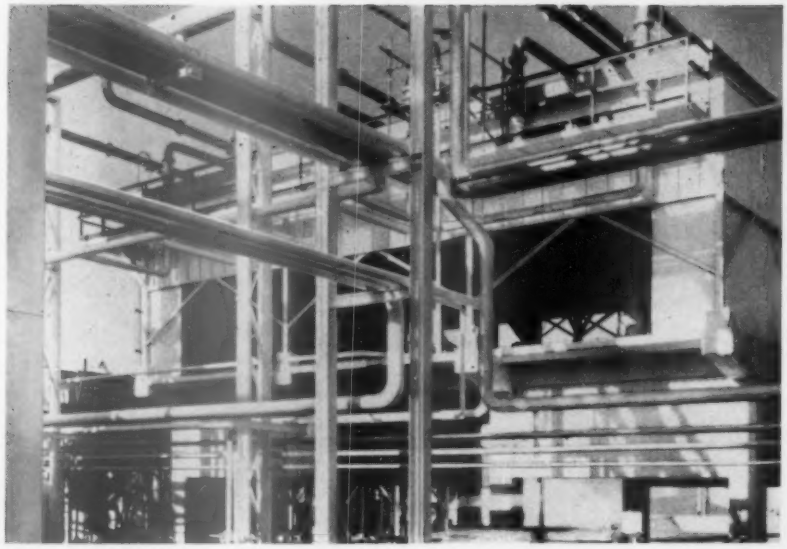
Variable-pitch fans, shutters, or a combination of these have not proved successful without additional precautions.

The freezing or clogging of the tube-side fluid due to low temperatures has been exaggerated by the fact that these coolers have been frequently designed to operate over a wide range of conditions. Tube-side flow and viscosity in these units frequently varies by a factor of 10. With such widely fluctuating variations in flow, it is essential that the unit be valved to guarantee a reasonably constant tube-side velocity. Most recent installations have had valves between each section or banks of sections for this control.

As a supplement to this, many methods have been tried to accurately control the outlet temperature and still guarantee against freezing without excessive operator attention.

Some of the most common methods are:

1. Steam coils mounted below the sections to heat the air when it's cold. Although this method has been used successfully under certain conditions in general it is expensive and offers only limited control. If excess steam is available and if the ambient temperature rarely drops below a dangerous level, steam coils may offer an economic solution to



RERUN OVERHEAD CONDENSER is one of a large group of air-cooled units used on a reformer. The ends of this unit are blanked off to prevent hot air from the coolers on either side from being drawn into the fan inlet. Fig. 2.

the problem, especially when used in combination with shutters.

2. Variable-pitch fans.
3. Shutters.
4. Two-speed motors.
5. Varying combinations of these.

All of these methods, although capable of controlling the outlet temperature, cannot in themselves insure against freezing without constant operator attention whenever the ambient temperature varies widely. In each case they suffer from a common fault: That cold ambient air comes in contact with tubes containing cold, viscous oil.

Most of the units operating successfully in this service have two common characteristics: First, there is a high tube-side pressure drop. Secondly, there is a provision to prevent cold air from coming into contact with the cold crude.

A high pressure drop is necessary to provide even distribution throughout the unit. It also provides a driving force which reduces the tendency to freeze in the tubes. Freezing takes place in that portion of the unit with the lowest Reynolds number. Therefore a low tube velocity is almost as detrimental as the high viscosity.

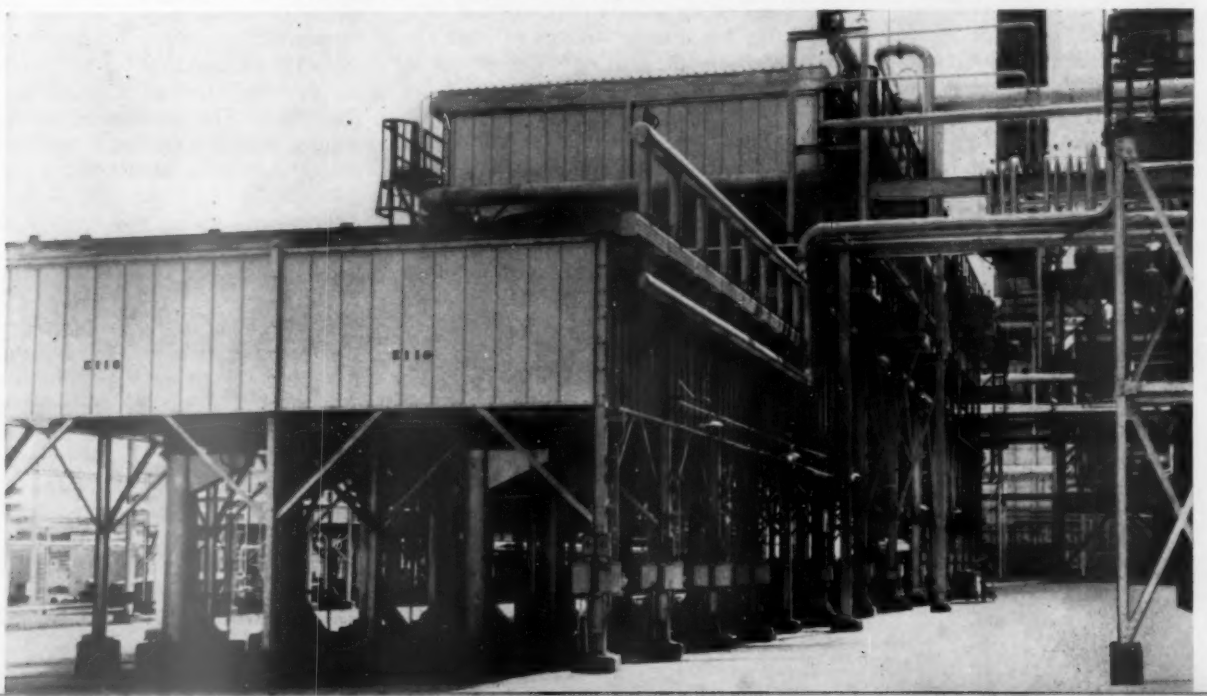
When the ambient temperature drops, the wall temperature and thus the wall viscosity are considerably lower than the bulk viscosity. Therefore, if some means is provided to decrease the temperature drop across the tube wall, the wall viscosity will approach the bulk viscosity; thus, the tendency for freezing is greatly reduced.

The most effective method is by parallel or cocurrent flow. Thus only the hot crude comes in contact with the cold air. At the inlet, the viscosity is low enough that the tube-side fluid will not freeze. By the time the crude has cooled to a dangerous level, the air has been heated to such a degree that no freezing can take place. Such an arrangement is easy to control with an automatic variable-pitch fan or automatic shutters, since it is impossible to cool the crude stream below outlet-air temperature.

Such a flow arrangement does suffer from a reduction in mean temperature difference and therefore usually requires additional surface and horsepower. This has led to a changeover to a counterflow arrangement during summer temperatures for some applications. However, sufficient surface and horsepower must be available to operate with a cocurrent flow during those seasons of the year that the temperature varies widely.

An alternative method which offers a minimum of heat-transfer sur-

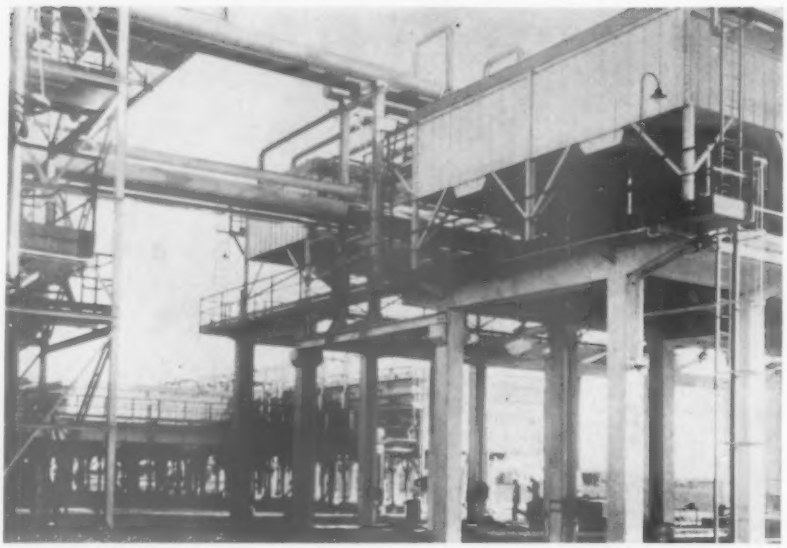
MECHANICAL EQUIPMENT is supported on the ground on these pipe-still condensers. Fig. 3.



face, excellent automatic control, and a minimum of freezing difficulties is a unit operating with a combination of countercurrent and cocurrent flow.

The exact flow pattern depends on the conditions for each exchanger. Many times it is necessary to provide crossover piping to change the flow pattern for different crudes so that the cooler may be fully adaptable for all conditions.

Another method which has proved effective for controlling the crude cooler to prevent freezing is by recirculating air. In this case part of the warm air normally exhausted to atmosphere is recirculated and used to warm or temper the incoming ambient air. This method, while extremely effective, has normally been used for the smaller exchanger.



OVERHEAD AND REFLUX CONDENSERS are mounted on elevated concrete platforms. Mechanical equipment for these units is supported from the structure. Fig. 4.

Condensers. Other exchangers requiring close control are the overhead and reflux condensers. In general, it has been possible to control these units with conventional methods, such as shutter or the automatic variable-pitch fan. Both of these control methods regulate the amount of air passing across the finned sections.

The automatic variable-pitch fan regulates the amount of air by changing the pitch of the fan blades. The temperature at the outlet of the exchanger is measured through a temperature controller, which, in turn, sends a pneumatic signal to the hub of the spring-loaded fan piston. As the temperature changes, the air pressure varies, changing the pitch of the fan blades.

Because of a desire for more accurate control by refinery operators and the fact that any spring-loaded devise has a hysteresis loss, an alternate fan using a positioner for accurate control has been developed. In addition, the spring has been replaced by a different air piston to eliminate the necessity to overcome the present spring load; thus, the complete assembly can be operated from instrument air.

This fan assembly is extremely sensitive and accurate and, when used with a slave temperature bulb, measuring outlet air temperature to regulate the set temperature on the controller, it can hold the most accurate temperature range.

One of the greatest advantages to the variable-pitch fan is the savings in operating horsepower. The ambient design conditions usually represent a temperature exceeded only 5 to 8% of the year. This temperature is generally only reached for about 12 to 15% of the year; therefore, during the remaining 85% of the year, the consumed horsepower is below design.

Shutters control the exchanger by the same method as the automatic variable-pitch fan, that is, by modulating the air flow through the exchanger. The principle is somewhat different in that shutters restrict the flow; however, the fan, gear, and motor continue at the same r.p.m. While there is some reduction in horsepower since the fan is not operating at the full design delivery, the horsepower savings will not approach the saving inherent in a variable-pitch fan.

Shutters do have two advantages: First, they hold the heat within the structure, and, second, they offer some protection to the top of the bundle. By the use of shutters, snow, wind, hail, and rain can be directed away from the exchanger and thus reduce the effect of adverse weather conditions.

Forced Draft vs. Induced Draft

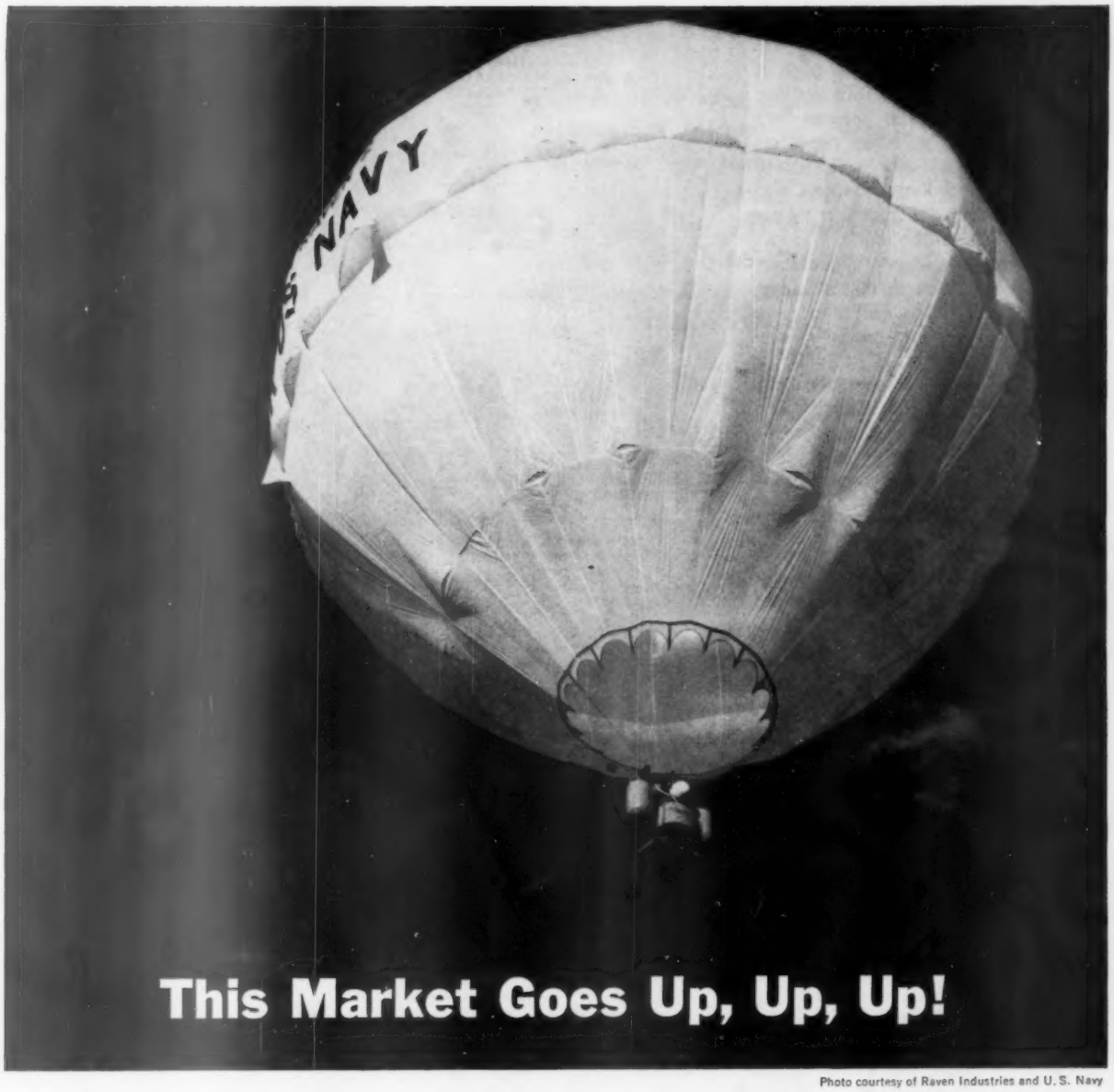
Concern over the extra cooling effect which rain may have has led certain operators to prefer the forced or induced type of air-cooled exchanger.

In the forced type, cooling surface is mounted on top of the structure. A fan and mechanical equipment are mounted beneath the section. Air is pulled in, at the ambient temperature, through the and fan ring and pushed across the extended surface. Thus the air is heated and exhausted from the top of the unit. The majority of all air coolers are of this type.

The unit has several definite advantages. In the first place, all mechanical equipment is mounted below the sections and is maintained at ambient temperature. In addition, it offers a flexible arrangement and various sized sections are adaptable to a common structure. Mechanical equipment can be mounted either directly from the ground on a pedestal or concrete pier or can be suspended from the structure. In all cases the air and thus the computed horsepower are rated at ambient conditions. The mechanical equipment is held to a minimum and long shafts and extra bearings are unnecessary.

Without question this type of an exchanger is the most versatile, most widely used, and mose trouble-free of all air-cooled exchangers.

Some engineers have objected to the forced-draft unit. The objection has been based primarily on the fact that fin tubes are subjected to all climatic variations and that the constantly changing weather conditions affect the control of the air cooler. Much of this objection is based on pure theory; however, in certain sections of the world these



This Market Goes Up, Up, Up!

Photo courtesy of Raven Industries and U. S. Navy

LP-Gas is such a versatile fuel that new uses for it arise regularly—such as heating air for the experimental Navy balloon above. It is already high in demand for cooking, heating, air conditioning and scores of other home and commercial uses. Small wonder that among petroleum products, LP-Gas boasts one of the best sales surges—7 per cent last year alone.

Most LP-Gas is produced by wringing out natural gas before it passes into transmission lines. Sinclair Oil & Gas Company owns fully, or in part, 38 gas products plants which process its natural gas output to recover the valuable LP-Gas. It markets the fuel under the Sinclair "Truflame" trademark through distributors in 38 states, and last year rang up a *sales gain double that of the industry.*

As its natural gas output rises, Sinclair is adding gas processing capacity and extending LP-Gas distribution. By expanding its endeavors in growing markets, *Sinclair concentrates on more sales of the most profitable products.*

ASTM—Sinclair salutes the American Society for Testing and Materials. Founded in 1898, ASTM promotes research to develop specifications and test methods which aid all industries in maintaining product quality. The scientific work of its 10,000 members is multiplied many-fold to benefit all consumers. Its D-2 committee, which deals with petroleum products, recently completed specifications for LP-Gas which recognize this fuel's expanding uses.

Sinclair

SINCLAIR OIL CORPORATION • 600 FIFTH AVENUE • NEW YORK 20, N. Y.

objections are justified.

Because of the hot air leaving the exchanger, snow has never been a problem as it melts before settling on the surface. Hail screens are frequently used in some areas to prevent damage to the fin tubes, and short wind fences around the top of the unit are common to direct wind around the unit.

However, the main speculation has been the effect that rain falling on the finned tubes will have. In those areas where torrential downpours are frequent, it can be a problem. In most of the world no such problem exists, and experience has proved that the normal methods of temperature control on forced-draft units can adequately control the cooler and condenser.

In fact, checks made during frequent rainstorms show that relatively little water actually hits the tubing. This can be explained by the evaporating effect of the warm air and also the air velocity at the exit from the exchanger.

Induced draft. Within the last few years the induced-draft structure has been gaining popularity. In the induced-draft exchanger the fan is located above the heat-transfer section and pulls rather than pushes the air across sections. Advantages claimed are: First, the finned section is partially protected from adverse weather. Second, because the air is exhausted at a greater velocity, the chance for recirculation is lessened.

Another advantage is that in case of power failure the induced draft, due to the stack effect, will have some cooling without the use of the fan. Also, an additional diffuser stack can easily be adapted to the induced-draft unit. This reduces the over-all horsepower by obtaining static regain and further increases the efficiency.

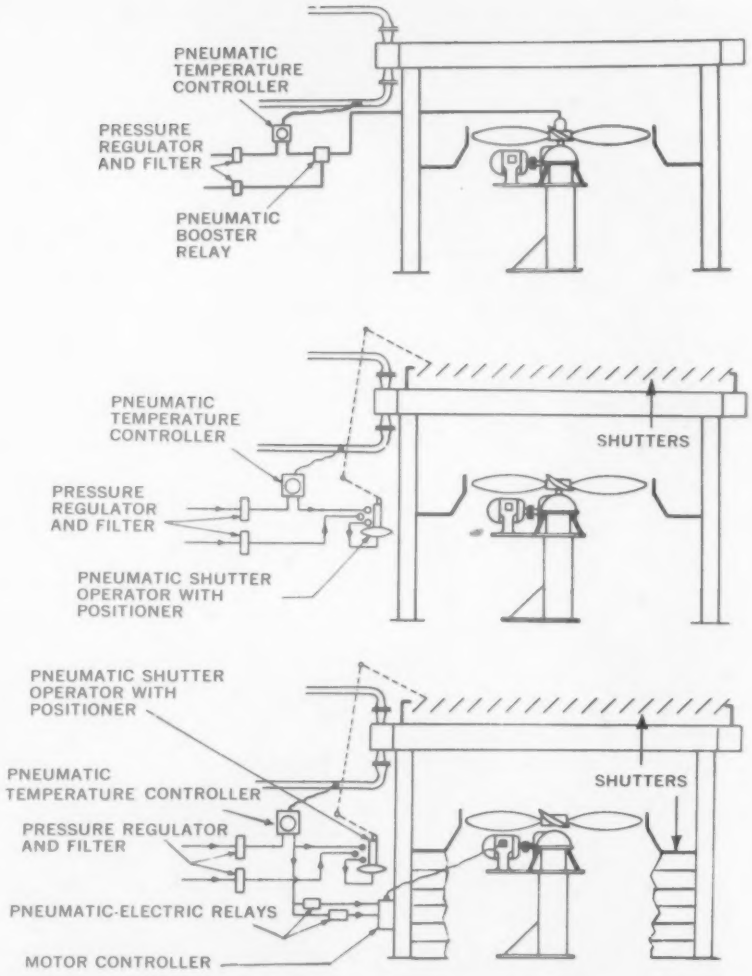
However, there are definite disadvantages to the induced-draft structure. Since the fan must always be mounted above the finned sections, the most logical position for the mechanical equipment is also above the finned sections. In such a location the equipment must be limited in size and type. With the mechanical equipment mounted above the sections, vibration is greatly magnified. Therefore, in general, the motor has been limited to about 25 hp. With larger drives, the mechanical equipment has generally been suspended either from the structure below the sections or mounted on the ground. In either case it is necessary to use an extended shaft to transmit power to the fan. This involves the use of more equipment and also requires a carefully laid out section arrangement to allow sufficient room for the shaft through the exchanger.

An additional problem involves the outlet air temperature of the individual exchanger. Since hot air is being pulled across the sections and through the fan ring, air density and horsepower must be calculated on the basis of the warmer air. Thus in general it requires more horsepower to do the same duty in an induced-draft unit than it does the forced-draft unit.

The induced draft does lend itself to the use of the stack which will reduce the over-all horsepower of the unit. However, such stacks have proved extremely expensive and are very difficult to justify within the United States. The horsepower evaluation of many of the European refineries is considerably greater than found in this country; therefore stacks have proved more advantageous in these installations.

With the induced-draft unit, special precautions must also be taken to keep the outlet air temperature from impairing mechanical equipment which is mounted above the fin section. This adds a further limitation. In some cases the unit must be extended to allow more air to flow. The additional air is necessary to keep the outlet temperature at a safe level.

In general, the maximum economical outlet temperature of an induced-draft unit is 185° F., with a maximum air temperature for the overhead V-belt drive of 170° F.



THESE AUTOMATIC ARRANGEMENTS are used to control r.p.m. of fan, pitch of fan blade, top shutters, and side shutters. Fig. 5.

Michael Faraday — discoverer of electromagnetic induction, 1831

From the minds of men . . .

THE FOUNDATION FOR TODAY'S ACHIEVEMENTS CAME FROM THE MINDS OF INSPIRED AND TALENTED MEN ■ FROM THE MINDS OF MEN ALSO WILL COME THE ADVANCES OF THE FUTURE ■ ONE OF EVERY TEN SCHLUMBERGER EMPLOYEES IS PRIMARILY ENGAGED IN RESEARCH AND ENGINEERING ■ EIGHT PER CENT OF SCHLUMBERGER INCOME IS REINVESTED IN THIS WORK ■ IN THE FUTURE, AS IN THE PAST, YOU CAN DEPEND ON SCHLUMBERGER FOR THE MAJOR ADVANCES IN WELL LOGGING.

SCHLUMBERGER
LEADS IN RESEARCH AND DEVELOPMENT

Georg Simon Ohm — Ohm's law of resistance, 1826

NOTHING SPARED TO BRING YOU COMPLETE SERVICE

When you contract for any HOUDRY service or product, you automatically gain access to the total resources of the entire HOUDRY organization. The result is convenience, and in many cases, significant savings in time and effort.

For example, the processor primarily interested in contract research can also get competent counsel on catalysts. Likewise, not only a process change, but also a complete economic evaluation of its possible effects can be secured through the same contact with HOUDRY.

Close-knit internal communications puts everyone who deals with any one branch of HOUDRY in touch with *all* branches: process design . . . economic consultation . . . engineering . . . research . . . technical aid . . . catalysts . . . catalyst service . . . custom catalyst manufacturing . . . nitrogen-containing organic chemicals.

*HOUDRY
PROCESS CORPORATION
1528 Walnut Street, Philadelphia 2, Pa.
*Houdry means Progress...through Catalysis

PART 2—TYPES OF DISTILLATION

Here's principle of

Fractional distillation

FIG. 3 illustrates a fractionator operating on our original feed mixture of 20% hexane—80% heptane. By comparing Fig. 3 with Fig. 2 (see Part 1, OGJ, Oct. 30) you can see logical improvement over the multiple-still unit. By making basically two changes to a multiple-still unit, it can be converted to a fractionator. These are: (1) place each still on top of the other and (2) have some type of opening (and liquid-holdup device) between the top of one still and the bottom of the next, to permit the upflow of the vapors and the downflow of the liquid.

In an actual fractionator, the opening between sections contains trays. Each of these trays and the space above it (up to the next tray) corresponds to one of the stills shown in Fig. 2.

Operation of Fractionator

The feed is heated before entering the fractionator, usually to about the midboiling point of the liquid mixture or to the approximate temperature of the material on the tray where feed enters the tower. The feed tray selected for use is the one which contains about the same composition material as the charge stream.

As the feed enters the tower, vapors are given off in large amounts. This is due to the fact that a "back pressure" is held on the feed stream, at the furnace outlet, to prevent too much vaporization within the furnace. The sudden release of pressure produces flashing (sudden vaporization).

Reflux and vapor flow. As the vapors rise up the tower, they are forced to come into intimate contact with downflowing liquid by means of trays, grids, or other contacting devices. During this contact, some of the heavier components of the vapor stream are condensed, and some of the lighter components of the downflowing liquid are vaporized.

As a result of this vaporization and condensation, the rising vapor stream becomes richer in the lower-boiling point components, especially above the feed tray. Hence, the section above the feed tray is termed the enriching or fractionating section.

As the concentration of the lighter components in the vapor becomes progressively higher in the upper part of the tower, lower temperatures exist in this section than in the bottom part. The lowest temperature is that of the liquid in the overhead condenser (total condenser).

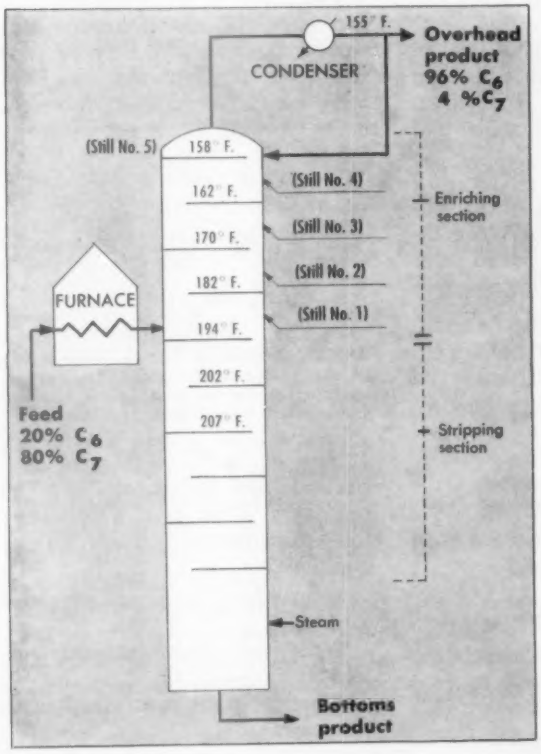
Just as vapors rise through the tower, so does liquid flow downward countercurrent to the vapor. This falling liquid is composed of: (1) vapors condensed within the tower, and (2) condensate, called reflux, which is pumped back into the tower.

Reflux is used to control the temperature of the fluids in the upper portion of the tower in most fractionators and, therefore, must be provided in an adequate and constant amount.

The temperature at the top of the tower must be just high enough to permit complete vaporization of the overhead product. Too low a temperature will result in a decrease in the yield of overhead product. Too high a tower top temperature will cause some of the higher-boiling components to be included in the overhead product.

The composition of the descending liquid will be different on each tray, since some of the heavier components from the vapor and some of the lighter components are vaporized from the liquid. As the liquid flowing down from the upper trays goes below the feed tray, the lighter components, not desired in the bottoms, are transferred into the vapor phase or "stripped" from the liquid stream.

If heat is being supplied to the liquid at the bottom of a tower by a reboiler, then the transfer of these lighter components is due primarily to the higher temperatures in the lower part of the tower. However, another method of obtaining "stripping action" is to use steam at the bottom of the tower. In this case, it is steam which reduces the partial pressure of the lighter components or fractions, and causes them to separate from the bottoms and rise up the tower.



BY PLACING each still on top of the other, the multiple-still unit was converted to a fractionator. Fig. 3.

Here's a new technique that splits apart planning and scheduling. It finds the critical jobs in a project, whether short and simple or long and complex. It answers the basic management question of how to best control the project. The technique is called . . .

Least-cost estimating and scheduling

BY F. BACKER, JR., A. W. BARKSON, AND M. C. FRISHBERG
IBM Corp.

LEAST COST Estimating and Scheduling (LESS) is a recently developed management control technique. It gets management better answers to questions such as:

- What is the project's completion date?
- Where do we stand in relation to the completion date?
- Will contract specifications be met?
- What is our schedule of operations?
- Where should we expedite to catch up?
- What is the cost to meet that completion date?

Or the basic management question—considering time and money, how can we best control the project? Proper application of LESS can answer these questions.

The range of projects that can be considered is enormous, from repair and maintenance of simple equipment all the way to research and development projects which may span years of time. For illustration simple maintenance and repair of a vacuum pump is used.

This was an actual job to which LESS techniques were applied. The results more than justified the effort expended.

Unlike the bar-chart operation, LESS splits apart planning and scheduling. First the plan is drawn. When satisfied that the plan is correct, the project is scheduled. When bar charts are used, each job must be planned and scheduled at the same time. This may lead to a schedule of total elapsed time longer than really necessary to complete the project.

From paper presented at ASME petroleum division conference, Kansas City.

Repairing a Vacuum Pump

Vacuum-pump repair steps are listed, but not necessarily in sequence, in Table 1. Someone knows the necessary steps to complete the project. If this is not true, there is no basis for starting. Therefore, new information is not necessary to implement LESS.

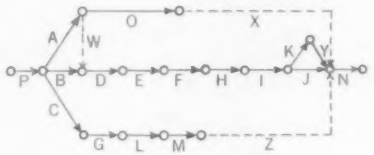
A vacuum-pump gland leaked and sprayed some product back on the electric motor. Apparently, something jammed the impeller and bent the shaft which caused the gland to leak.

The pump was part of a complex continuous process. When inoperative, it seriously affected plant production. Preventive maintenance was done periodically. And down time for it or any conceivable repair was about 2½ hours. After application of LESS, time was cut in half. This may not seem significant, but with production worth thousands of dollars an hour, the saving was substantial.

The arrow diagram for the project may look rather complicated but is comparatively easy to construct, Fig. 1. Arrow diagrams have been used for years to represent many types of logical processes.

Table 1—Job list

A.	Disconnect lines
B.	Remove packing gland
C.	Disconnect coupling
D.	Remove bowl
E.	Remove impeller
F.	Remove shaft and bearings
G.	Check motor shorts, ground, bearings
H.	Install replacement shaft and bearings
I.	Replace impeller
J.	Replace bowl
K.	Replace packing, lantern rings, and gland
L.	Dry motor with heat lamps
M.	Reconnect driver
N.	Reconnect lines, run in, check leaks
O.	Wash out lines
P.	Lead time



ARROW DIAGRAM shows relationship of steps and schematically represents logic of entire project. Arrow I represents Job I from Table 1. Fig. 1.

How is an arrow diagram constructed from the list of jobs? The procedure is to pick a job—any job—from the list and ask it three questions:

What immediately precedes this job?

What immediately succeeds this job?

What can go on concurrently with this job?

Arrow diagram should be constructed by someone who knows a great deal about the project, not only what operations are necessary for project completion, but also their relationship.

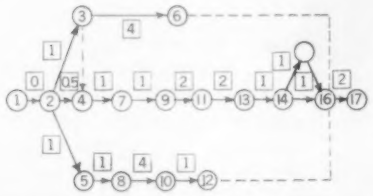
Arrow length has no relation to their completion time or duration. Time flow is from left to right and this is why arrows have heads and tails. A project cannot be considered reversible, nor is an arrow diagram a road map.

A correctly drawn arrow diagram has no cycles. There can be no chain of arrows whose heads and tails circle around so the final job in the chain connects to the first job. Such cycles are allowed in flow diagrams, but in every case there is a way out of the loop.

Dotted arrows represent dummy jobs introduced during drawing of the arrow diagram and are added to the job list. Dummy jobs preserve project logic, and are brought into being by the arrow diagramer.

First step in actual scheduling is to number the arrow diagram, Fig. 2. Rule 1 is that each node must have a different number. Nodes are meeting places of arrows. Second rule is that in no case shall the arrow's tail number be larger than its head number.

Durations are assigned to each job after numbering. The exact job duration may not be known. Estimate of duration should be the best one that can be given. Duration of each job is then added to the arrow diagram, Fig. 2.



NUMBERS are assigned to each node. Each job has a time duration. Fig. 2.

Now it becomes possible to go through a procedure which results in a definite schedule, Fig. 3.

Each individual job must start and finish on time within this schedule. Float is the difference between its earliest and latest start time and the entire project could still be done within the schedule.

However, if delayed, all other jobs in the chain will be forced to start at their latest start time and will have no float of their own. Free float indicates that a job can be delayed by the amount of free float and never affect early start time of any job downstream.

Some jobs have a total float of 0. Their earliest and latest start times are the same in each case. A curious relationship is obvious between the head and tail numbers. Head number of one job will be tail number of another job. These jobs connect to form a continuous path or main chain through the entire project.

It is this path of chain, comprised of critical jobs, that determines project length. Duration of the entire project will be the sum of individual job durations that lie along the critical path. When the project slips behind schedule, the jobs along the critical path must be expedited to get back on schedule.

If anything but jobs along the critical path were expedited, the only thing expedited would be float time which would not help make up lost schedule time. Thus, for the first time during scheduling there is a way to find what is critical and what is not.

Critical path is not intuitive. Critical paths may violate all laws of common sense and yet be perfectly valid.

Determining the critical path

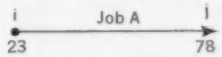
Critical path	Job I	Job J	Duration	Start time Early	Start time Late	Finish time Early	Finish time Late	Float Total	Float Free
(*)	1	2	0	0	0	0	0	0	0
(*)	2	3	1	0	0	1	1	0	0
	2	4	0.5	0	0.5	0.5	1	0.5	0.5
	2	5	1	0	2	1	3	2	0
(*)	3	4	0	1	1	1	1	0	0
	3	6	4	1	5	5	9	4	0
(*)	4	7	1	1	1	2	2	0	0
	5	8	1	1	3	2	4	2	0
	6	16	0	5	9	5	9	4	4

THE LETTER "I" refers to the tail number of an arrow, the letter "J" to the head number, and "Duration" to the duration assigned to the job before scheduling the project. These three pieces of information were known before the scheduling technique was applied. From these figures the LESS technique developed all the rest of the schedule. Fig. 3.

Node Numbering

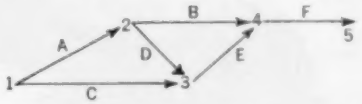
A computer solution to the LESS problem requires a correct arrow diagram with every job represented by an arrow, and the head and tail of each arrow numbered by prescribed rules:

Rule 1. Each job is represented by an arrow numbered (i, j) where $i < j$.

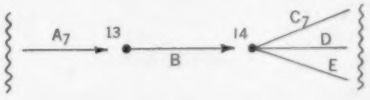


where $i < j$ $(23 < 78)$

Rule 2. Numbers used in the entire project must start at 1 and run consecutively until all nodes are numbered.



Relations between jobs in diagram. The end or beginning of every arrow is called a node. Numbering a job implies numbering the two nodes associated with it. Any job and the two nodes associated with it must have at least one job following and at least one job preceding. The requirement is met in the partial diagram.



If a general node is considered and the jobs entering and leaving it, for example:

CONTROL . . . essential element in economy!

In any engineering or construction project the real basis of economy is fast completion. Brown & Root has become legend for putting plants "on the line" ahead of schedule. ▲ This is possible because, with its own personnel and equipment, Brown & Root has the capability of a "turnkey" job. Every step is carefully controlled, from engineering through the manifold steps of construction and equipment installation. This "control" can be interpreted in fast, economical completion for you. ▲ If your organization is planning new construction or plant expansion, you'll profit by talking to the man from Brown & Root.

BROWN & ROOT INC.

ENGINEERS • CONSTRUCTORS

NEW YORK • TORONTO
LONDON • EDMONTON
MONTREAL • SAO PAULO
WASHINGTON

POST OFFICE BOX 3, HOUSTON 1, TEXAS • CABLE ADDRESS: BROWNBILT

then this shows the relations between jobs as follows:

Job	Is followed by	Is preceded by
A	D and E	(not shown)
B	D and E	(not shown)
C	D and E	(not shown)
D	(not shown)	A, B, and C
E	(not shown)	A, B, and C

Job D cannot start until jobs A, B, and C are complete. Once they are complete nothing else prevents job D from proceeding.

For any job decide what jobs must immediately precede it, and what jobs must immediately follow it.

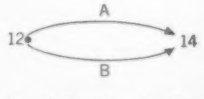
Exceptions to this rule are: first jobs need have no predecessors and last jobs need no followers. A node corresponds to a particular stage of events. Any given event should be representable in terms of as few events as possible. Beginning jobs should all originate from a single node and final jobs should all end at a common node corresponding to the event of project completion.

All jobs leaving a node must have the same predecessors. All jobs entering a node must have the same following jobs. Thus, any two jobs either have all predecessors in common or none in common and also have either all followers in common or none in common.

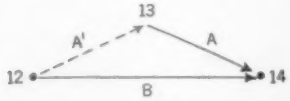
Dummy jobs and miscellaneous problems arise from consideration of four basic rules for arrow diagraming.

1. Every job must have a unique (i, j) set of numbers assigned to it with $i < j$.
2. All jobs entering a node have identical followers.
3. All jobs leaving a node have identical predecessors.
4. A node describes the complete relation between all entering and exiting jobs.

Concurrent jobs are two jobs starting and ending at common nodes.



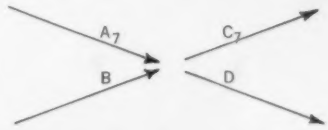
Rule 1 is violated. A dummy job must be added either preceding or following either job, preference being to precede a job with the dummy.



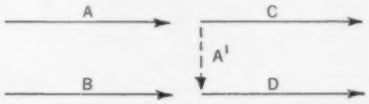
where A^1 has zero duration and zero cost.

Multiple vs. single job dependencies are where a number of jobs enter and exit from a common node. When but one job (or more) need only be preceded by some entering jobs, these jobs are separated by a dummy job. For example, if we wanted to express

if we put

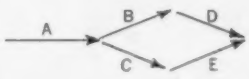


then Rule 4 is violated. A dummy job, A^1, is introduced.

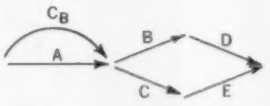


All relationships are correctly displayed.

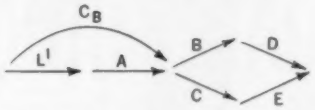
Delivery restraints. Consider this project:



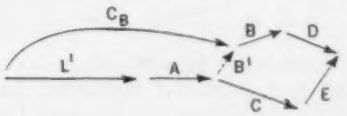
Let duration of job A (d_A) be 3 days. Suppose material to perform job B needs 10 days to order. Draw in a constraint arrow (C_B) and d_{CB} = 10 days. The diagram would then appear:



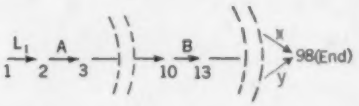
but now the problem of concurrent jobs arises with Jobs A and C_B. Introduce a lead time job (L^1) and enter any delivery restraints from the beginning of L^1 to the involved. The diagram becomes:



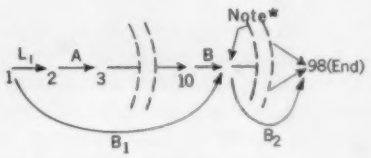
The solution would be satisfactory if there were no other jobs which had the same predecessors as B. However, Rule 4 is violated since it indicates that Job C depends on the delivery of Job B materials. Thus, a dummy job (B^1) is introduced.



Completions restraints are generally introduced in latter phases of diagram preparation. Consider these parts of a larger diagram:



Suppose it is found d_B = 3 days. Its earliest start is at relative time 14 days. And latest is at time 19 days. Total project duration is 33 days. Suppose that B should be completed at a specific time, say the earliest possible finishing time of 17 days (earliest starting time plus its duration) because of manpower requirements. Two dummy jobs, B_1 and B_2, can be introduced as follows:



*This assumes that B is the only predecessor for all jobs following B. In other cases appropriate dummies must be added.

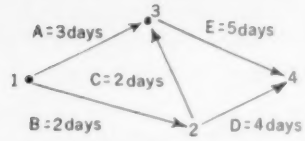
where d_{B1} = 17 days and d_{B2} = 16 days (33 − 17) which insures that B will be completed at a time of 17 days and not later. Insures it in the sense that the schedule will call for completion not earlier or later than t = 17 days.

Scheduling

Existence of a properly numbered arrow diagram is assumed. It accepts as input jobs identified by a (i, j) number and corresponding duration times. A schedule is calculated. Start and finish times are calculated for each job. Allowable float is found. The ideas involved are simple but to understand them the few definitions must be grasped firmly.

Earliest Node Time

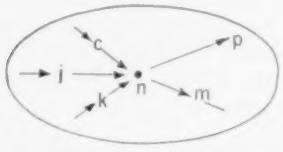
Consider a project



Job has five jobs related as shown and with indicated durations. Example has 4 nodes. Each node corresponds to an event in time. Thus, Node 3 corresponds to completed jobs A and C but not started job E.

Project starts at time = 0 then job A will be completed at time = 3 at the earliest. Job C will be completed at the earliest at time t = 4. Hence, Node 3 (event 3) will be attained at the earliest at time t = 4. This earliest time to attain the node is called earliest node time of the node (t_n^E) where n is the node number.

Consider a project, and the nth node where job (i, j) duration is called D_{ij} and where for all i such that $i < n$, t_i^E has been calculated.



It is then seen that t_{nE} is the minimum value of numbers of form ($t_i^E - D_{in}$) where there are as many numbers involved as there are jobs entering node n. The problem is more easily thought of if a matrix (upper triangular) is formed of D_{ij} and attaches a column at the left as a t_i^E vector. Thus, in this case one has i

t_i^E	i \ j	2	3	4
0	1	2	3	
2	2		2	4
4	3			5
9	4			

NOTE: A zero cell implies existence of a dummy job.

with a blank cell if (i, j) is not defined and (i, j) cell filled with D_{ij} if (i, j) is a defined job. Setting $t_i^E = O$, calculate

$t_i^E = \text{Max}\ \{t_k^E + D_{ki}\}$ for $i = 2 \ldots n$

number one in
SERVICE
VALUE
LEADERSHIP

SERVICE . . before, during and after installation . . from the industry's best trained field force. VALUE . . from long-lasting, easy-to-maintain equipment that lowers operating costs. LEADERSHIP . . in engineering, design and manufacturing . . that pays off in higher equipment efficiency. You get the number one treatment when you buy from the number one company — Continental-Emsco . . Worldwide!

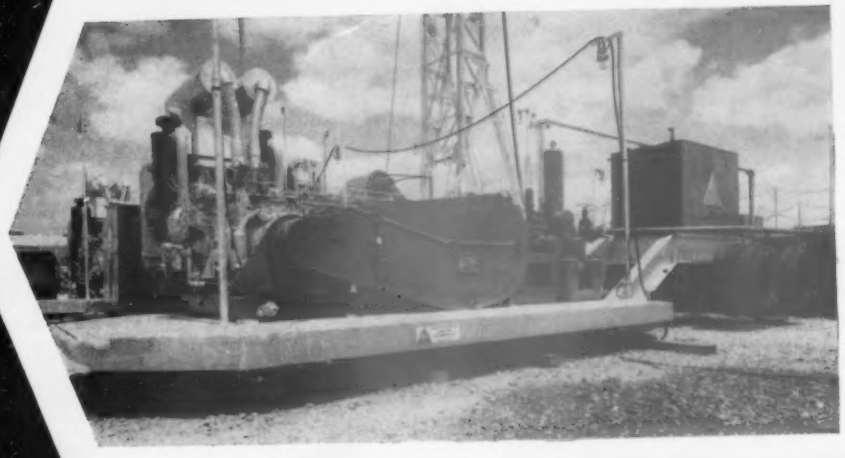
CONTINENTAL'S *got it* WORLDWIDE!

CONTINENTAL EMSCO

CONTINENTAL-EMSCO COMPANY, a Division of The Youngstown Sheet and Tube Company
General Offices: Dallas, Texas • Export Office: New York, New York

C11-29

WANT TO MOVE SLUSH PUMPS EASIER?



CONTINENTAL HAS THE ANSWER.. *Worldwide!*

Continental's seven slush pump models can be trailerized for contractors who want to move fast. New or old pumps can be mounted on custom-built trailers for special rigs or on standard trailers. Either way, you'll be able to reduce slush pump rig-up and tear-down time from your bids. Ask your Continental man about the reasonable cost of trailerizing these pumps.

CONTINENTAL EMSCO

CONTINENTAL-EMSCO COMPANY, a Division of The Youngstown Sheet and Tube Company
General Offices: Dallas, Texas
Export Office: New York, New York

8P11-31

where n is the last node number. Thus, the numbers indicated. Value t_4^E shows the earliest time to finish is 9 days, project duration (λ).

Latest node times find the latest time for arrival at a node and still complete the entire schedule with the duration λ found in the earliest node time calculations.

Call the latest time for node j by t_j^L. Start by setting $t_n^L = \lambda = t_n^E$ then calculate

$$t_j^L = \min_k \{t_k^L - D_{jk}\} \text{ where } k > j$$

and (j, k) is defined. This calculation goes in the order t_n^L, t_{n-1}^L, ... t_2^L, t_1^L.

Think of this as generating a t_j^L vector which can be shown below the D_{ij} matrix. The complete matrix then looks as follows:

t_i^E	i \ j	2	3	4	
0	1	2	3		
2	2		2	4	
4	3			5	
9					
	0	2	4	9	t_j^L

Critical path. A job is on the critical path if any delay in its start or completion would increase the duration in which the project can be completed. Consider a job (i, j) as shown:

$$\underset{t_i^E}{i} \longrightarrow \underset{t_j^L}{j}$$

Assume all jobs prior to (i, j) were completed on time, then time available for doing the job is equal to the latest time for node j less the earliest time for node i. Or let the time available for (i, j) be called TA_{ij} then

$$TA_{ij} = t_j^L - t_i^E$$

If time available equals the duration required then no time can be wasted before starting the job. This means the job is on the critical path. Hence a job is critical if:

$$D_{ij} = t_j^L - t_i^E$$

Earliest and latest job times. Once earliest and latest node times are known the earliest and latest times for starting and completing any job can be found.

Earliest time job (i, j) can be started equals the earliest node time for node i or if earliest starting time for job (i, j) is called ES_{ij} then $ES_{ij} = t_i^E$

Adding the duration of job (i, j) to the earliest time one gets the earliest finishing time for job (i, j) (EF_{ij})

$$\text{or} \quad EF_{ij} = ES_{ij} + D_{ij}$$

If job (i, j) completes later than the latest node time for job j the project completion will be delayed. If latest finishing time for (i, j) is called LF_{ij}, then $LF_{ij} = t_j^L$. Subtracting duration gives the latest starting time for (i, j) (LS_{ij}) or $LS_{ij} = LF_{ij} - t_j^L$.

Float times. Found in discussing critical path was:

$$D_{ij} \leqq t_j^L - t_i^E$$

or, using time available concept for a job where

$$TA_{ij} = t_j^L - t_i^E$$

$$D_{ij} \leqq TA_{ij}$$

Time available for any job is always greater than or equal to the job duration. We note if

$$TA_{ij} - D_{ij} > O$$

says starting of job (i, j) can be delayed by the quantity

$$TA_{ij} - D_{ij}.$$

This amount of total delay possible is called Total Float of job (i, j) (TF_{ij}) where

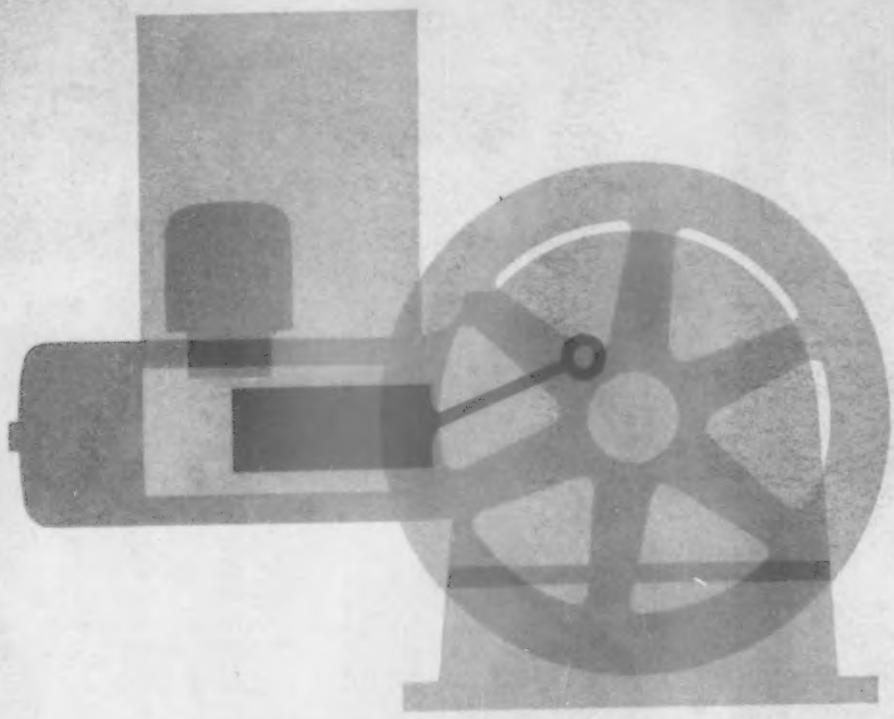
$$TF_{ij} = TA_{ij} - D_{ij}$$

$$= t_j^L - t_i^E - D_{ij} \geqq O$$

In this notation a job is critical if and only if $TF_{ij} = O$.

Now if any job (i, j) uses total float, actual occurrence of node j is forced to be the latest node time for node j. Thus, any job starting at node j no longer has the earliest starting time possible.

How long can job (i, j) be de-



REPAIR COSTS..OR PROFITS?

After many years of profitable pumping, tens of thousands of C-E Engines bear testimony to low-cost service life. When repairs are necessary, unitized assemblies of parts allow replacement in the field without special tools or equipment. Even your pumper can handle the job. Quick starts, easy adjustments, and simplified servicing add to the worldwide acceptance of these reliable engines. Designed exclusively for oil-well pumping, they're your best buy for the long run.

CONTINENTAL EMSCO

CONTINENTAL-EMSCO COMPANY, a Division of The Youngstown Sheet and Tube Company
General Offices: Dallas, Texas
Export Office: New York, New York

CE11-31

layed so that any job starting at node j can still start at its earliest starting time? The available delay is called free float since it is the time available to delay the job without affecting any other job starting times. Thus, it is seen free float of (i, j) (FF_{ij}) is found by the formula.

$$FF_{ij} = t_j^E - t_i^E - D_{ij}.$$

It is noted whenever job (i, j) is the only job entering node j then

$$FF_{ij} = O.$$

The advantage of free float is that whenever a job's free float is exceeded then those immediately following jobs can be advised that their earliest starting times are no longer the same. Whenever total float is exceeded, all following jobs will be affected and there will be an unavoidable delay in total project duration.

Free float measures amount of total float which can be used without affecting any following earliest-starting times. Remaining amount of float is called dependent float (DF_{ij}). Hence:

$$DF_{ij} = TF_{ij} - FF_{ij}$$

If any dependent float is used then the project can be completed with the original duration but certain jobs are not capable of being started at their earliest starting times.

Independent float is one final type of float useful in considering the problem of delays in general. In developing free float (and all other floats) the time available for doing the job assumed it could be started at the earliest starting time. Independent float asks what amount of delay is available if a job is to start at the latest starting time and yet be finished prior to the earliest node time of the node a the job end. It thus forms the quantity.

$$t_j^E - t_i^L - D_{ij}$$

This quantity may be negative and hence the maximum of this quantity and zero is chosen or,

$$IF_{ij} \equiv \max [t_j^E - t_i^L - D_{ij}, O].$$

It is found that to be a positive quantity job (i, j) cannot have been the job which determined either t_j^E or t_i^L.

Bibliography

Astrachan, A., "Better Plans Come From Study of An Engineering Job": Business Week, March 21, 1959, p. 60-66.

Kelly, Jr., J. E. and Walker, M. R., "Critical Path Planning and Scheduling": Proceedings of Eastern Joint Computer Conference, December 1-3, 1959, p. 160-173.

Sayer, J. S.; Kelley, Jr., J. E.; and Walker, M. R.: "Critical-Path Scheduling": Factory, July 1960, p. 74-77.

PERT, Program Evaluation Research Task, Phase 1 Summary Report, Special Projects Office, Bureau of Ordinance, Department of the Navy, Washington, July 1958.

Backer, Jr., F., "A Discussion of Problems Involved in LESS": (unpublished paper) available from IBM, 3424 Wilshire Blvd., Los Angeles.

Backer, Jr., F., "LESS Phase IA—A 650 Program for Proper Arrow Diagram Node Numbering": ibid.

Smith, M. E., "A Discussion of An Action-Planning and Control Technique": ibid.

Fulkerson, D. R., "A Network Flow Computation for Project Cost Curves," Publication No. P-1947, Rand Corp., Santa Monica, Calif., March 1960.

Malcolm, D. G.; Roseboom, J. H.; Clark, C. E.; and Frazer, W. "Application of a Technique for Research and Development Program Evaluation": Operations Research, Vol. 7, 1959, p. 646-669.

BOOKS

BASIC CONCEPTS OF PHYSICAL GEOLOGY. By Edgar Winston Spencer. Published by Thomas Y. Crowell Co., 432 Park Avenue, New York 16, N. Y. 472 pp. $8.50.

This book and "Basic Concepts of Historical Geology" were written as a single-integrated book for a 1-year course in physical and historical geology designed for students who are taking geology as a liberal arts course as well as for students who plan to major in geology.

Some of the new features in this book are an introductory section about the profession, a chapter on the sources of energy, a chapter on the major divisions of the earth's crust, a chapter on the concept of sequential development of land forms by various geomorphic agents, and the physical history of North America is taken up starting with the Precambrian and continuing until the present.

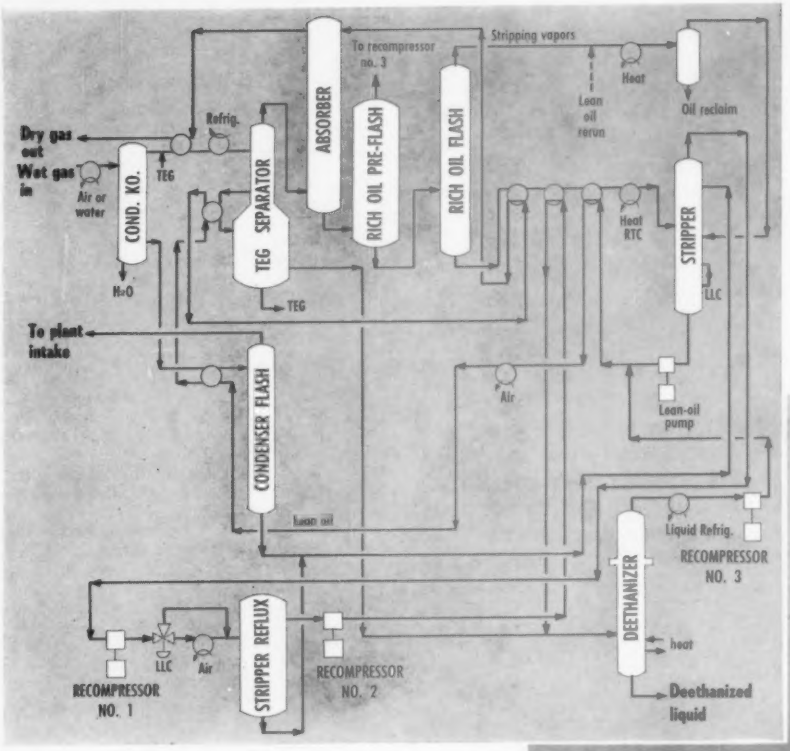
OIL AND PETROLEUM YEAR BOOK, 1961 EDITION. Compiled by Walter E. Skinner. Published by Walter E. Skinner, 20, Copthall Avenue, London, E.C. 2. 800 pp. $7.

This is the fifty-second edition of this volume, which gives particulars of 1,100 producing, refining, transporting, and marketing world-wide oil companies.

The book includes 2,000 headings under an international "Buyer's Guide," a 10-year world-oil production table, 10-year compilation of oil consumption per head in selected areas, and 10-year information on development in world refinery capacity.

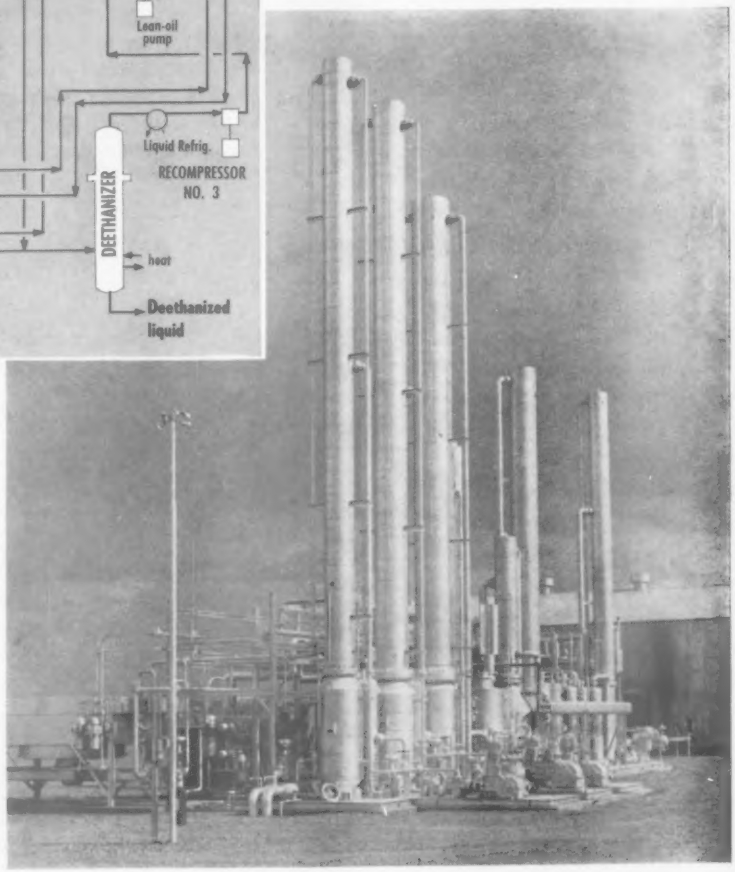
The bulk of the book—almost 600 pages—deals with details about oil companies operating throughout the world.

Note: The Oil and Gas Journal maintains a book department. Write to the READER SERVICE DEPARTMENT, P. O. Box 1260, Tulsa 1, for copies of the book list. Often books reviewed here may be purchased from this source.



THE THERMOFLASH PROCESS, combining high propane recovery on rich or lean gas with simplicity of operation, may be adapted to a wide range of operating situations.

RECENTLY COMPLETED PLANT in Wyoming was prefabricated in Brea, Calif., and moved by trucks for reassembly on the plant site. Main columns from left to right are debutanizer, depropanizer, deethanizer, glycol still, glycol separator, absorber, flash tanks, and stripper.



Thermoflash oil-absorption process

—process details, advantages, construction, and equipment

BY R. J. HULL AND R. T. THOMPSON
Gas Processors, Inc.
Brea, Calif.

IN RECENT YEARS there has been general acceptance of low-molecular-weight refrigerated-absorption-oil processes using rich-oil deethanization and reboiled strippers. The Thermoflash process uses refrigeration and low-molecular-weight oil, but has very different heat exchange and stripping arrangements which take advantage of the basic thermodynamics of oil absorption, hydrocarbon flashing, and oil stripping.

Presented at local meeting of CNGA, Los Angeles.

Process Details

The flow diagram shows the process in detail. As shown, the equipment is typical for processing medium-rich (approximately 2.0 to 4.0 gal. per M.c.f. of propane and heavier) gas at 500 psig. with 75% or more propane recovery.

Wet inlet gas, after cooling, goes to a condensate knockout vessel for water and liquid hydrocarbon separation. Liquid hydrocarbon is flashed through heat exchange with lean oil to a low-pressure vessel which feeds to stripper reflux; this step adequately dehydrates the condensate.

Triethylene glycol (TEG) is injected before the wet gas enters the heat exchange and chilling section.

Chilled wet gas, hydrocarbon condensate, and TEG, at 0° to 20° F. are separated in the TEG separator. The liquid mix feeds from the upper portion of the separator through heat exchange with lean oil to a lower liquid phase separator compartment. The temperature of about 80° F. gives good phase separation, and leads to about 50% demethanization of the hydrocarbon liquid which then feeds to the deethanizer.

Chilled wet gas from the TEG separator feeds to the absorber, and dry gas feeds through inlet-gas heat exchange to dry-gas outlet.

Cold rich oil passes from the absorber to the preflash vessel. Vapors go to third stage recompression. Operation of this vessel at about 300 psig. results in the proper stripping-vapor ratio regardless of lean-oil rate.

Preflashed rich oil goes to a second rich-oil flash vessel for separation of stripping vapors. Lean-oil rerun is accomplished by feeding a small lean-oil stream into the stripper vapors ahead of the heater and knockout vessel.

Rich oil from the second flash vessel enters a series of rich-oil heat exchangers and passes to the stripper which operates at 20 to 60 psig. The temperature of the stripper feed is only 160° to 200° F. The low-pressure and low-temperature levels by comparison to those in reboiled strippers reduce the total rich-oil heat-exchange surface, and make possible useful recovery of heat ordinarily wasted.

The net heat requirement of the entire stripping system is provided by two recompressions plus a small amount of heat for the final rich-oil heater which may be supplied by hot compressed plant inlet gas or by indirect heat recovery from compressor exhaust gas.

Hot lean oil from the stripper is pumped to high pressure and joins the hot discharge of the third-stage recompressor. This recompressor stream includes deethanizer overhead and primary rich-oil flash gas. On a high-propane-recovery plant, the net effect is to fully saturate the lean oil with methane, to oversaturate with ethane (some net ethane stripping with consequent refrigeration effect occurs in the top of the absorber), and to put in any propane that was unrecovered in the deethanizer overhead.

Nearly all of the injected presaturation material dissolves in the lean oil either before or as the mix is transferring heat to the rich-oil stream. This useful recovery of the heat of condensation of these materials represents a basic heat saving with respect to conventional presaturation techniques.

Cooled, presaturated, lean oil enters an air cooler and is cooled about 20° F., then passes in heat exchange first with flashing inlet condensate and then with TEG separator condensate. The temperature of the lean oil at this point is usually about 80° F. Because of the particular oil heat-exchange arrangement, the deethanizer feed temperature is set at about this same level. Thus, adequate cooling and condensation of the deethanizer feed stream is accomplished at below the air-cooling level, with the heat of compression and condensation having been delivered to the rich-oil stream.

The lean oil then passes through the usual cold rich oil-warm lean oil exchange and enters the absorber.

Stripper overhead vapors at about 150° F. are compressed in the first-stage recompressor, air cooled, and pass into the stripped reflux drum. Lean-oil volumetric and molecular weight balance is achieved automatically by a bottoms level controller on the stripper actuating an air-cooler bypass ahead of the reflux drum. Nominally hexane-free lean oils, of boiling range 200° to 400° F., and having about 125 mol. wt. become established in situations having the normal amount of such materials in the plant intake.

Stripper reflux rates and consequent heat loads on the overhead cooler are very low. Part of the overhead cooling comes from the plant inlet condensate which is routed to stripper reflux for removal of off-color materials. In addition, the low-pressure and temperature levels in the still make possible the operation at considerably higher than usual relative volatilities between gasoline and lean-oil fractions, making separation easier with less heating and cooling.

Stripper reflux-drum vapors are compressed in the second-stage recompressor, cooled and condensed by heat exchange with rich oil, and sent to the deethanizer.

Deethanizer overhead vapors join cold rich oil preflash vapors and pass through heat exchange with liquid refrigerant. In this manner the refrigerant becomes subcooled, and a portion of its heat is passed into the rich-oil stream via the third-stage recompressor.

The deethanizer itself operates at 300 to 450 psig. and has a special GPI refrigerated upper section that combines cooling and fractionating. Use of the special section eliminates need for the rather difficult deethanizer reflux pumping service. Operation of this type of column is very stable.

Deethanizer bottoms pass to tankage or further fractionation.

Table 1 shows typical data for plants recently put into operation or now under construction.

Advantages

By comparison with modern conventional processing and considering the range of plant sizes and recoveries indicated here, the GPI Thermoflash process has the following advantages:

1. The heating and cooling balances of the plant are dominated by single-compressor units, each ordinarily having two cylinders on refrigeration and three on recompression. Refrigeration requirements are less than for conventional

Table 1—Typical data for new and projected plants

	A	B	C	D
Throughput, M.c.f.d.	2,500	*5,500	6,000	15,000 to 30,000
Absorber pressure, psig.	300	800	160	400 to 1,000
Intake, gal. per M.c.f. of propane plus	8.8	4.6	1.0	8.8 to 1.5
% Recoveries:				
Propane	85.6	83.9	0	65 to 75
Butanes	99.4	97.1	25	96 to 98
Pentanes plus	99.0	98.6	85	91 to 95
Total recompression horsepower	102	161	21	.....

*Capable of expansion to 10,000 M.c.f.d. with minor additions.

Congrats and $25.00 to Charles L. Mizer, 114 Lexington Ave., Taft, Calif.

Tough, tested and ready to roll . . . that's the story in a nutshell on Lone Star casing, tubing and line pipe. Tough, because it's made of quality steel by men who know the needs of the oil country. Tested so carefully that every length of pipe meets or exceeds API requirements before it leaves our plant. And because we're located in the heart of the Mid-Continent producing area, Lone Star pipe can usually be on-the-job at your well site overnight.

Men in the saddle in the oil business know that Lone Star pipe is *dependable*.

Neighbor, wherever you are, specify Lone Star and we both get a good deal.

©1956 Lone Star Steel Company

Lone Star STEEL COMPANY

EXECUTIVE—SALES OFFICES
W. Mockingbird Lane at Roper • P. O. Box 12226 • Dallas, Texas
DISTRICT SALES OFFICES
912 Republic National Bank Building, Dallas, Texas
Houston, Texas | Midland, Texas | Tulsa, Oklahoma

processing because of the oil-presaturation techniques, practical close heat-exchanger approaches, and opportunities to pick up cooling by exchange below the plant air-cooling level.

A plant under construction for operation on lean gas will generate all electricity for air-cooling fans and lean-oil pumping by means of a generator run by the gas compressor.

2. Because of the thermodynamic balance of the process, fuel requirements are very low. For example, when processing 1.0-gal. per M.c.f. gas for 65% propane recovery, generating all required plant electricity, and making a deethanized liquid, the total fuel requirement is 0.7 vol. % of intake gas.

3. In modern dry-stripping plants, control of the variables of lean oil-gasoline balance, lean-oil molecular weight, and quantity of stripping vapors required, is necessary but burdensome in plants which must have minimum attendance. In this process these variables are effectively locked in.

4. The basic process is highly adaptable to air cooling. This shows up particularly in the case of the conventional stripper overhead in a high propane-recovery plant, where use of only air cooling is difficult. Air cooling is advantageous in smaller plants, particularly in cold areas.

5. The usual multiplicity of pumping services is reduced to only the lean oil and glycol pumps. No rich oil, absorber intercooler, stripper or deethanizer reflux, or fractionator feed pumps are required. This contributes greatly to ease of startup and recovery after upsets, and is particularly advantageous in unattended or semiattended plants. The lean-oil pump is a positive-displacement variable-speed pump, thus eliminating entirely internal plant flow recorders and flow controllers.

Construction

Because this process is particularly adapted to only partially attended operation, a plant can be built to operate completely independent from any outside utilities. Also, it is a dry-cycle process suitable for use in cold climates without large expensive buildings. It was therefore, only natural to develop certain construction techniques that

would make this process economical for small and medium volumes of gas. Completely standardized plants were not believed practical since there is a wide range of volumes, pressures, and gas composition that must be taken into consideration. However, by standardizing on plant layout and certain major components, many basic savings have been achieved without sacrificing flexibility.

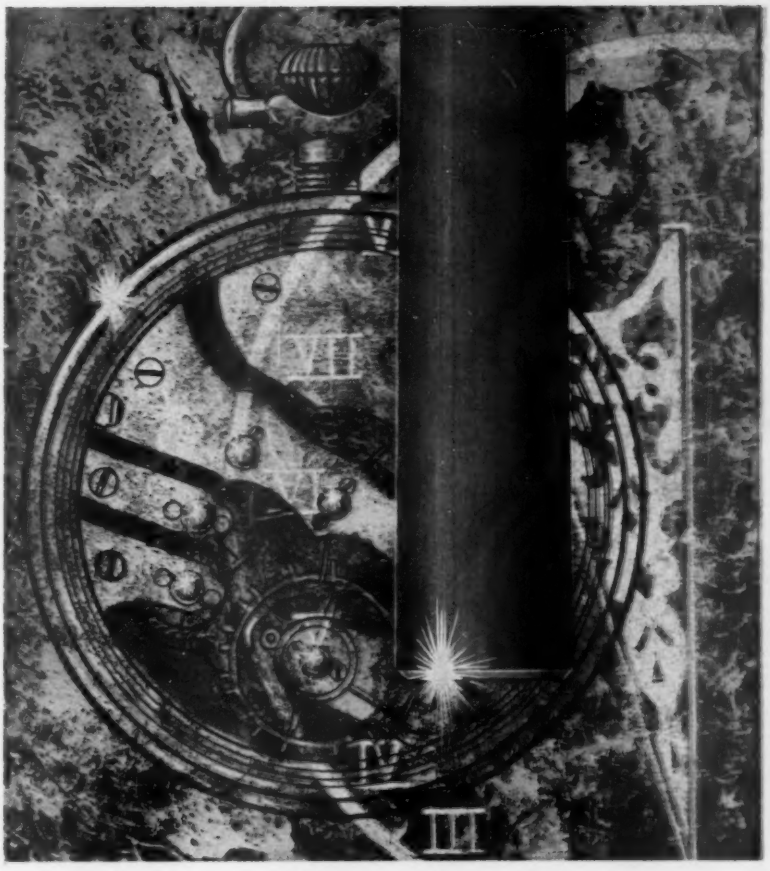
Equipment

Heat exchangers. Although there are many separate heat-exchange services, standard return-bend heat exchangers are used throughout the plant. The number of units for each service can be varied and provision can be made for addition of parallel exchangers for future expansion. Because of the rather narrow over-all temperature range of the process, the exchangers can be preinsulated individually and used interchangeably.

Since the recycle stages of compression and the refrigeration horsepower requirements vary only within certain limits with processing pressure and liquid content of the gas, a skid-mounted compressor can be supplied with cylinder sizes and clearance pockets to satisfy a wide range of operating conditions. Multiple compressors can be used for larger plants and as stated previously, the compressor engine can also drive the generator for auxiliary fans and pumps, and supply the necessary process heat through product deethanization.

Skid mounting. By standardizing an over-all plant layout, skids designed and fabricated to receive a range of vessel and column sizes are practical. Even the interconnecting pipeway supports are standardized so that the pipeway is shop assembled and tested before shipment, minimizing the problems involved in field fabrication.

Instrumentation. The process itself makes complicated control equipment unnecessary. Changes in operating conditions tend to be self-correcting through the interlocking of heat exchange, refrigeration load, and recycle compression. Level controllers, pressure controllers, and temperature controllers can be locally mounted and require little attention from the operator.



GEM
OF THE
OIL AND GAS
INDUSTRY

Products of proud craftsmanship, Lone Star casing, tubing and line pipe are formed from tough, high quality steel . . . then precision finished to meet exacting API requirements. Here is pipe so uniformly dependable that it has become the standard of comparison throughout the oil and gas industry. And Lone Star's location in the heart of the Mid-Continent oil producing area means faster delivery . . . on the double service that can usually put pipe on your location overnight. It pays to pick Lone Star!

Lone Star STEEL
COMPANY

EXECUTIVE—SALES OFFICES
W. Mockingbird Lane at Roper • P. O. Box 12226 • Dallas, Texas
DISTRICT SALES OFFICES
912 Republic National Bank Building, Dallas, Texas
Houston, Texas | Midland, Texas | Tulsa, Oklahoma

A 60-INCH VIEW OF CAT'S POWER SHIFT 583 PIPELAYERS

Report from Jack Hodges, General Supt., J. P. Neill & Company, Inc., Birmingham, Alabama

"The power shift on the new Cat 583 allows split-second shifts when juggling 60″ pipe. The operator can handle the draw works levers and change travel speeds by nudging the *single* transmission lever with his forearm—impossible otherwise. When climbing these grades, he can smoothly drop to a lower gear to keep the load moving. Machines with other type transmissions must stop and slow down the operation."

Jack Hodges is talking about performance from the two 583s working on the industrial water line from Fort Smith Dam to Birmingham, Ala. They're handling 60″ pipe, weighing 20,000 lb. per 40′ joint, over rough terrain with grades up to 67½ degrees. "It's the kind of job that brings out the best and shows up the worst in any machine. That's why the 583s look so good."

The beautifully engineered combination of 235 HP, 137,000 LB. LIFT CAPACITY, POWER SHIFT TRANSMISSION, and an unmatched 21″ GROUND CLEARANCE equip the 583 for heavy work in mountains or swamps . . . work that other machines can't handle over ground where other machines can't go. No wonder men who work with the 583 talk long and favorably about it.

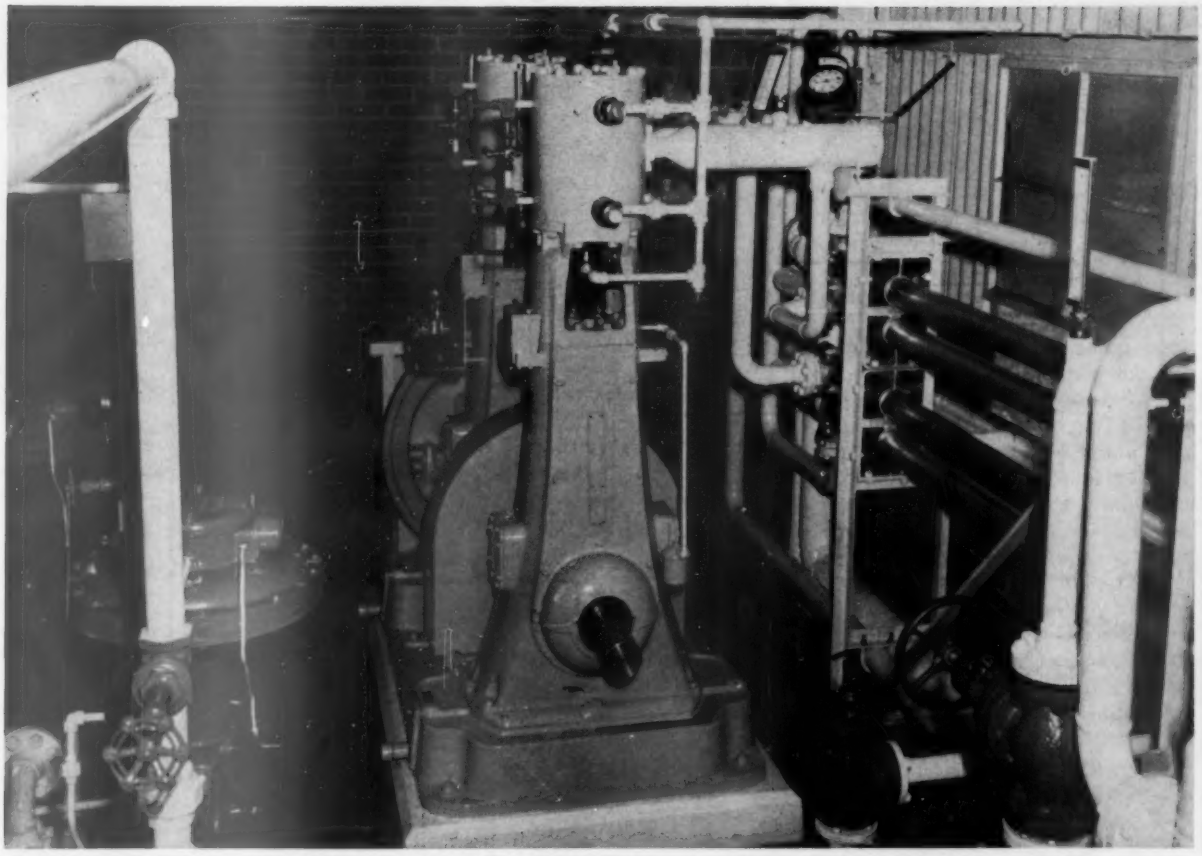
For your own record-setting production *with low cost* . . . see your Caterpillar Dealer.

Caterpillar Tractor Co., General Offices, Peoria, Ill., U.S.A.

CATERPILLAR

Caterpillar and Cat are Registered Trademarks of Caterpillar Tractor Co.

HEAVY-DUTY PIPELAYERS FOR THE HARD WORK



DUPLEX DIFFERENTIAL EXPANSION ENGINE at Hardinsburg, Ky., station of Texas Gas Transmission Corp. Two hairpin heat exchangers are shown to the right of the engine and bypass regulators on the left. Fig. 1.

Expansion engine powers compressor-station generator

Installation at cost of $31,000 saves $5,000 annually in electric-power costs.

BY O. P. DRAKE
Senior Staff Engineer,
Compressor Dept.,
Texas Gas Transmission Corp.

ENERGY from the expansion of fuel gas is being reclaimed by Texas Gas Transmission Corp. to generate power at a main-line compressor station.

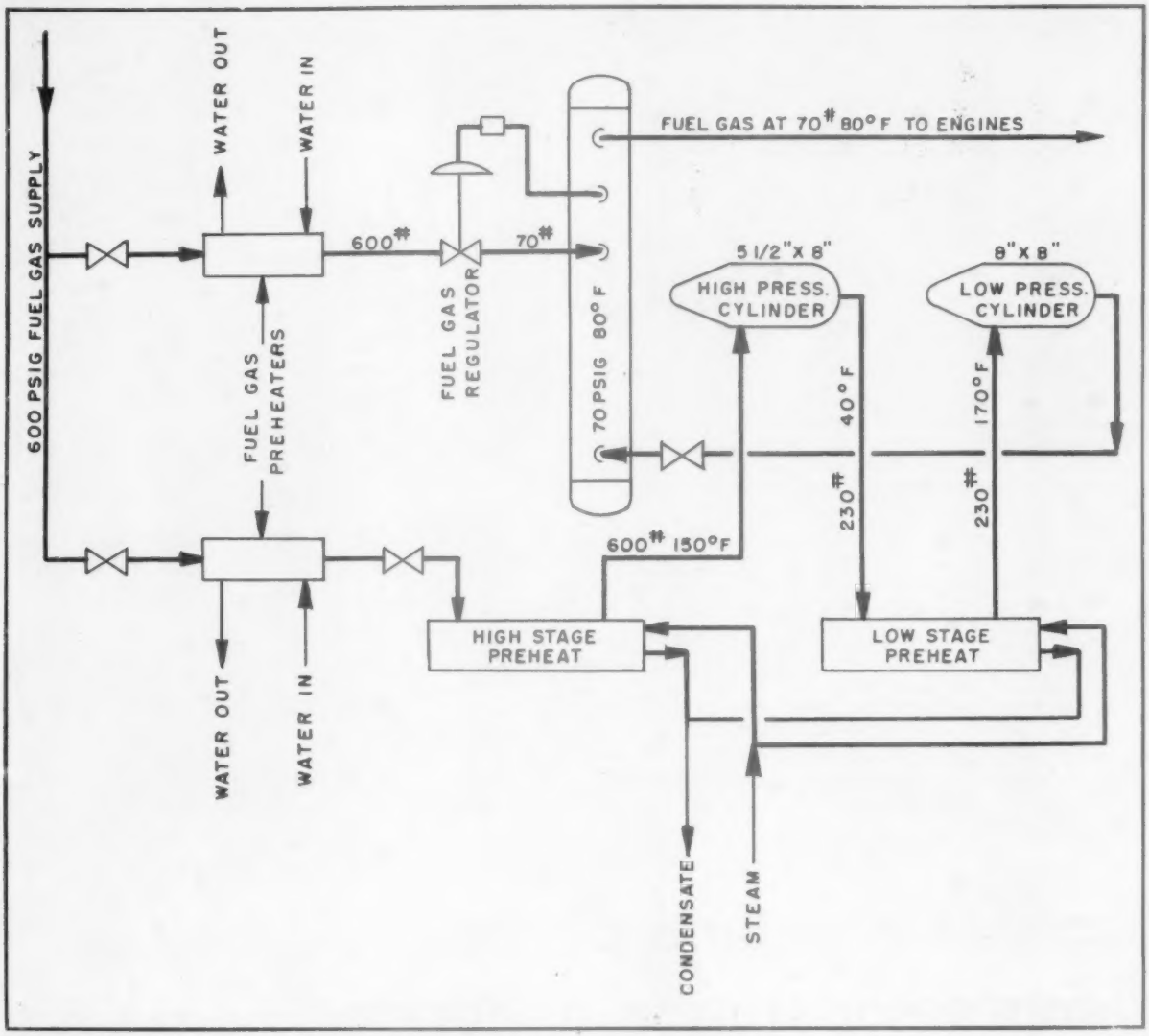
The concept of extracting and using expansion energy is not a new or original idea. However, the use of gas expansion to operate a small reciprocating type engine-generator unit to replace purchased power at a compressor station is a new application of this concept.

Over the years, we were aware that a great amount of energy was being wasted in the expansion of engine-fuel gas from station suction pressure down to a suitable pressure for use as engine fuel. This waste was compounded when consideration was given to cost of compression. With this thought in mind, a study was begun to determine the feasibility of using expansion energy as a means of generating electrical power.

Study factors. This study involved such factors as power load, volume of fuel gas used, cost of purchased power, and costs of making a test application of such an installation.

As a result of the study, our Hardinsburg, Ky., compressor station was selected for the initial installation since its operation closely met the requirements which would justify such an installation.

Hardinsburg station operates on our 26-in. main-line system with 10,500 hp. developed by seven Cooper-Bessemer GMW-6 engines. Each engine is equipped with a dependable unitized drive system which provides all necessary power for engine cooling and jacket water. This power is developed by a drive from the parent engine shaft through a speed increaser which in turn drives a generator, exciter, and jacket-water pump. The oil pump is also driven directly off the engine. This setup, in addition to making the engine self-sustaining, has re-



FLOW DIAGRAM of differential expansion engine piping. A second regulator in the fuel line to the engines which serves as a safety regulator is not shown. Fig. 2.

sulted in a relatively small purchased power cost of about $5,000 per year, dedicated principally to lighting, air compression, various liquid circulation and miscellaneous small motors. Auxiliary power for use in the event of power failure was provided by a 100-kw. gas-engine generator set.

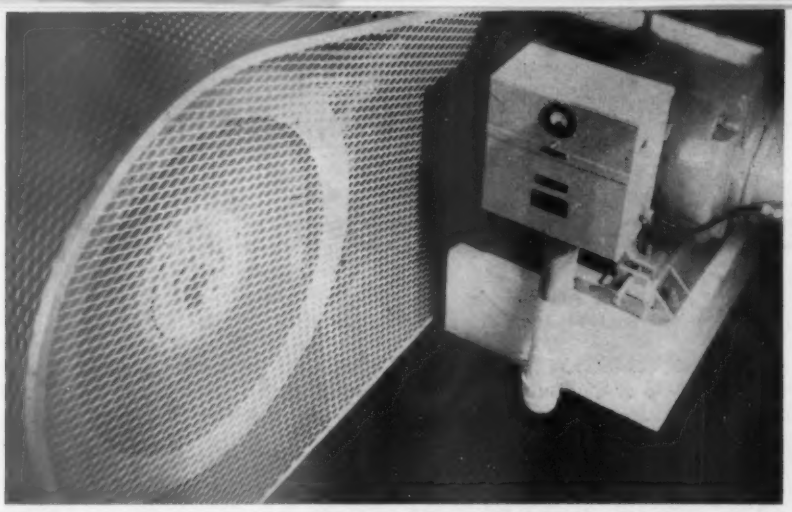
Load established. At Hardinsburg, our survey indicated a fuel-gas consumption rate of approximately 2 M.M.c.f.d. along with a normal maximum electrical power load in the vicinity of 60 kw. with occasional peaks of 65 kw.

The fuel gas at this station is supplied from the station suction at about 500 psig. It is then regulated to 75 or 80 psig. before entering the compressor-yard system with further pressure regulation at each engine. It was evident that the 2 M.M.c.f.d. of gas consumed as engine fuel at this station each day when expanded through a ratio of almost 7 to 1 represented a significant source of energy wasted in our conventional one-cut regulation system.

At this point, we contacted the Skinner Engine Co. regarding a differential-pressure unit which they manufactured. Basically, this unit is a high-pressure piston valve, double-action, two-cylinder, vertical steam engine sized to meet gas handling requirements. In our service, it is used as a pressure reducing mechanism with no consumption or loss of gas handled other than a small volume of gas used as boiler fuel to produce steam required for gas preheat. Fig. 1.

Economic study. After further discussions with the Skinner people in which we outlined the findings of our study of operating conditions, we received proposals on various options designed to use approximately 100 hp. of waste energy. With cost information at hand, we completed the economic study which indicated possible savings in operating costs.

We then decided to proceed with the installation of a two-cylinder tandem unit which would drive electric-generating equipment capable of supplying our peak power requirements. In this installation, an existing brick and transite fuel meter building was chosen to house the Skinner expansion engine-generator unit. The choice of this building ne-



A SPECIAL FLYWHEEL SHEAVE and V-belt arrangement drive the 75 KW brushless generator from the expansion engine shaft. A brick firewall separates the engine from the generating equipment. Fig. 3.

SUMMARY OF OPERATING DATA AND INSTALLATION COSTS DIFFERENTIAL EXPANSION ENGINE & GENERATOR

Operating data Hardinsburg, Ky., compressor station	
Installed horsepower	10,500
Fuel used, average day in 1960	1,904 M.c.f.
Expanded from 600 psig. to 70 psig. with expansion engine	
Maximum available power	70 kw.
Station normal peak	60 kw.
Actual average load	33 kw.
Approximate yearly cost of heating gas for expander	$ 400.00
Total cost of purchased electric power—1959	**4,630.00**
1960 (Est.)	**5,100.00**

Material	Aproximate installation cost of expansion engine and generator
Expansion engine	$13,800
Generator, wiring, switchgear	4,850
Engine to generator drive	1,350
Engine piping	4,250
Gas pre-heat exchangers	700
Foundations	550
Meter-run replacement	450
Misc. material	300
Total material	$26,250
Total labor & other costs	4,750
Total cost of installations	**$31,000**

cessitated some changes in our metering and regulating facilities. The meter runs formerly housed in the building were relocated to provide more usable space in the building. A brick firewall was installed in the building to segregate the gas-expansion engine and the generating equipment.

The building also houses a bypass regulating system installed in parallel with the expansion engine. This arrangement shown schematically in Fig. 2, permits a wide load variation on the Skinner expansion engine, depending on power requirements, while maintaining a constant pressure fuel supply to the compressor engines.

Two-stage unit. Since a two-stage differential pressure power unit was selected, special consideration was given to the selection of gas heating equipment. The small amount of space available for the installation necessitated selection of equipment of a compact nature. Our final selection consisted of a hairpin-type heat-exchanger section for each of the high-stage and low-stage gas preheat.

The first or high stage of the unit, having a bore of 5½ in. and an 8-in. stroke, expands the preheated 600-psig. gas to approximately 230 psig. The gas then passes through the second steam-to-gas preheat exchanger which raises the gas temperature to 170° F. and on into the 8 × 8-in. low-stage unit where it is expanded to 70 psig. at 80° F. The expansion through the tandem units extracts a maximum of 100 hp. of energy which in the past was being wasted.

The energy thus reclaimed is transmitted by a shaft extension through the brick firewall to a special flywheel sheave and V-belt arrangement driving the electrical generating equipment. Fig. 3.

Generating unit. This generating equipment consists of a 75-kw. brushless generator - exciter unit. Accessories used with the generator-exciter unit include a 400-amp., three-pole, 240-volt fused disconnect switch and a frequency relay.

The frequency relay provides positive protection to the generator equipment due to overload or inadequate supply of gas to the power unit. This equipment is tied into the station main power panel to permit automatic load switching from the differential pressure power panel unit to the 100-kw. auxiliary engine generator set.

The transfer of load is accomplished through use of the frequency relay which is set to open the exciter circuit at approximately 57 cycles after an appropriate time delay to avoid switching because of a transient starting load. This unloads the expansion engine generator and will dump the load to an automatic throwover switch at the main panel board.

As the relay actuates to transfer the load, the throwover switch sequences the starting and loading of the auxiliary engine generator set to maintain a continuous source of power.

Once the load transfer to the auxiliary generator has been effected, it is necessary to transfer the load back to the expansion engine generator manually. This is necessary if mechanical or electrical problems have developed or if main engines fall off the line, reducing the available fuel for expansion.

Problems minor. Problems encountered in this, our first installation of a differential-pressure engine-generator unit, were all of a rather minor nature.

Of particular importance in the original design considerations is a means of minimizing the effect of large electrical starting loads.

This can be accomplished by several methods, such as (1) installation of a low voltage starter, (2) use of a type of hydraulic or centrifugal coupling which can accomplish a gradual loading of the motor, and, (2) the incorporation of a maximum WR^2 or flywheel effect into the prime mover and drive.

With 1 year's operation experience behind us, we feel quite confident that we developed a very useful and reliable system of converting a hitherto untapped source of energy into useful work and at the same time reduce the over-all station operating costs.

How much do pipeline systems cost?

BY W. L. NELSON
Technical Editor and Petroleum Consultant

We are looking for a quick rule-of-thumb method for estimating the cost of a gas-gathering system. Do you have any suitable rules? S. G. F.

Costimating No. 22, "Pipeline Construction Costs," December 3, 1956, suggests the use of dollars per mile per inch diameter as a method of quickly judging pipeline investments. It shows costs of $1,330-$1,520 per inch-mile for gas-gathering systems but the figures are for the year 1946. Accordingly, it is necessary to have a cost index for bringing the 1946 costs up to date.

Although a cost index for pipelines is shown in Costimating No. 22, it extends to only the year 1955. Accordingly, a new Gas-Gathering-Line Cost Index is suggested here in Table 1. Also shown in Table 1 is a revised index for the cost of line pipe, and the three other components used in computing the Gas-Gathering-Line Index.

Approximate designs of pipeline systems were made in developing the new Gathering-Line Index of Table 1. The cost of line pipe and fittings was found to average about 50% of the total cost, labor about 29%, and other expenses (mainly materials) about 21%. However, the percentage of labor was higher in 1946 and much lower in 1960, especially the common labor. The line-pipe index is based on quotations during the years 1947-1956 accumulated by the valuation department of the Interstate Commerce Commission and used by them to obtain an index,[1] quotations in the author's files (1946-1958), and finally Code 1014-58 of the Bureau of Labor Statistics (1954 to date). The BLS Code is especially useful because it is published each month in "Wholesale Prices and Price Indexes." The wage (labor) indexes are those of the Nelson Refinery Construction Cost Index.[2] The "other expenses" index is also taken from the Nelson Refinery Construction Cost Index (the materials component) which is published each month in The Oil and Gas Journal.

The index shown in Table 1 is based on 45% line pipe, 20% expenses, 15% skilled labor, and 1946 common labor at 20% but decreasing to 9% for 1961. This means that only about 89% as much labor and material is employed during 1961, as compared with 1946. Another way of expressing or handling technological improvements is to keep the same percentage proportions, but rduce or change the labor cost in proportion to the productivity of the labor. Thus, for 1961, the productivity of labor is about (15 + 20) ÷ (15 + 9) or 1.46, or 46% greater than in 1946. The amount of common labor used in 1961 is less than half (9/20) used in 1946.

Oil-Pipeline Cost Indexes are shown in Table 2. The new Oil Pipeline Index of Table 2 is based on 40% of the Line-Pipe Index (Table 1), 20% of the Skilled-Labor Index, 20% of the Miscellaneous Equipment Items (pumps, engines, electrical equipment, etc.) of the Nelson Refinery Construction Cost Index, and Common Labor 20% during 1946 but varying and ranging down to only 10.5% during 1961. Thus, the amount of materials and labor required in 1961 is only 90.5% as much as in 1946.

The ICC indexes for Oil Gathering and Trunk Lines[1] extend back to the year 1934:

1934	66.2	1941	76.2
1935	69.5	1942	88.1
1936	69.5	1943	94.0
1937	71.5	1944	91.4
1938	70.2	1945	92.6
1939	65.6	1946	100.0
1940	66.2		

Technological improvements in the construction of pipelines have been taking place constantly, which means that fewer workmen are now used, and the proportion of the cost of labor to the total cost has been decreasing (at least since 1946). This can only mean that wages have been increasing slightly less rapidly than have improvements in construction methods. Although improved methods of construction will continually be devised, especially in the construction of small lines, the rate of technological advancement will not be as large as in the past decade.

References

1. Hearings before the Antitrust Subcommittee (No. 5) of the eighty-fifth Congress (first session), Part I—Vol. I, Oil Pipelines, Oct. 21-24, 1957.

2. Itemized Cost Index published each quarter (January, April, July, and October) in The Oil and Gas Journal. The wages are taken from Engineering News Record.

Table 1—Cost index for gas-gathering systems (1946 = 100)

	Line pipe	Common labor	Skilled labor	Other expenses	Gas gathering system
1946	100	100	100	100	100
1947	115.0	115.0	112.0	122.4	116.5
1948	133.4	131.0	125.0	139.5	134.2
1949	149.2	138.0	133.9	143.6	144.2
1950	156.5	148.1	140.0	149.5	150.9
1951	167.2	156.8	148.3	164.0	159.9
1952	170.1	168.2	157.9	164.3	161.7
1953	178.9	181.2	167.3	172.4	167.3
1954	182.7	192.1	174.6	174.6	168.1
1955	193.0	199.4	179.8	176.1	170.7
1956	219.8	209.2	187.3	190.4	185.8
1957	244.5	221.0	196.3	201.9	202.0
1958	252.4	235.7	205.1	204.2	207.4
1959	251.5	248.6	214.6	207.8	210.3
1960	248.9	261.1	223.5	207.6	210.5
1961 est.	246.3	275.0	233.0	207.4	211.8

Table 2—Cost indexes of oil pipelines (1946 = 100)

	Oil pipeline index	Gathering lines (ICC)	Trunk lines (ICC)
1946	100	100	100
1947	115.4	114.5	114.5
1948	131.5	134.0	134.0
1949	139.8	141.0	141.0
1950	145.5	146.7	146.7
1951	155.4	154.6	154.6
1952	158.8	160.3	160.3
1953	163.9	167.2	168.3
1954	167.0	166.0	167.2
1955	172.4	169.4	170.8
1956	188.6	183.3	185.7
1957	203.2	....	....
1958	208.7	....	....
1959	211.2	....	....
1960	212.9	....	....
1961 est.	213.8	....	....

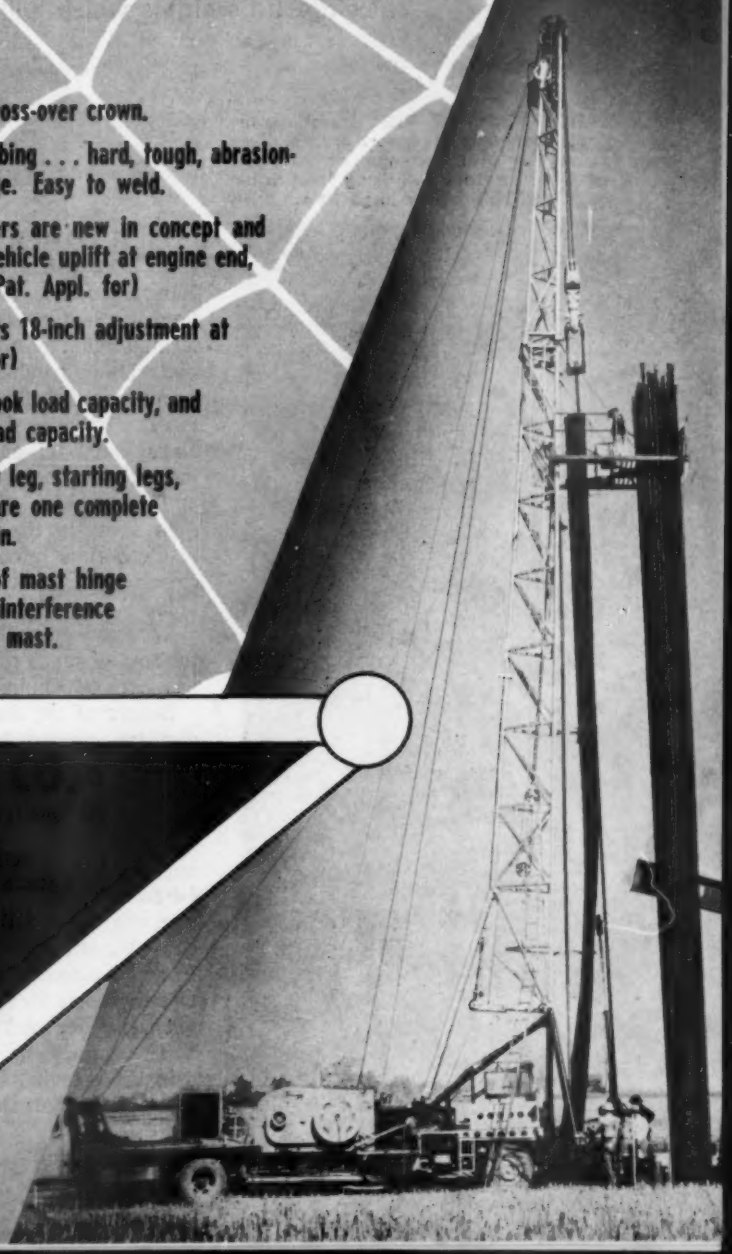
Consider the spider's web . . . a marvelous bit of engineering when adapted to a spider's purpose. But if you're not in the business of trapping flies, we invite your attention to a service mast that eliminates the usual spider web of guy lines . . . in fact, requires no guy lines at all!

The BENDER Tripod
Guyless Mast

in ENGINEERED GUYLESS . . . requires no spider-web of guys . . . is designed to function perfectly with NO GUYS of any kind! This is not a re-hash of old ideas with a different paint job, but a new engineering concept, field-proven by experienced designers and operators. Positively the only truly engineered-guyless mast! Furthermore, all Bender masts are designed in complete accordance with API Standard 4D . . . accomplishes on 3 axles what others attempt to do on 4 axles and is still legal in Texas, California and most states. (Full range of larger sizes also available.)

In addition — Bender features include:

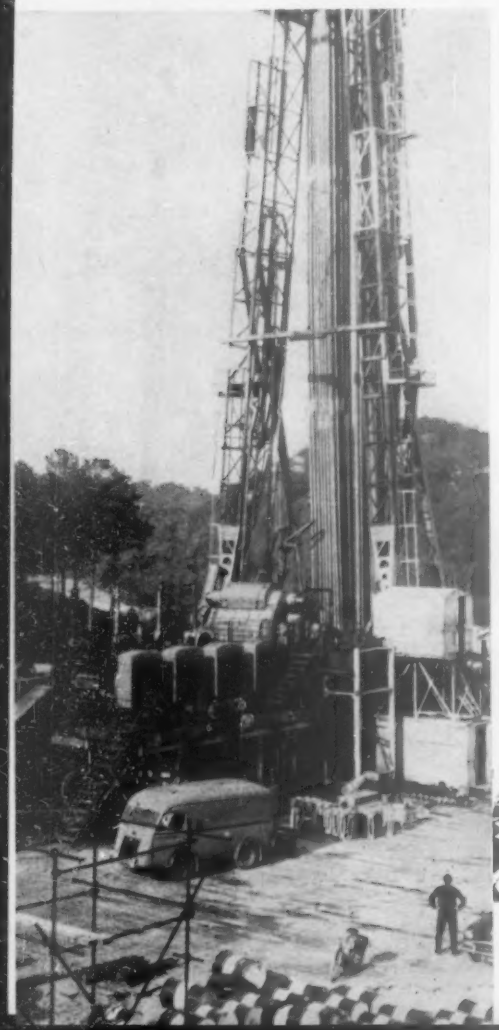
- **All three mast legs equally loaded with patented cross-over crown.**
- **Mast legs of round, seamless, ultra-high-strength tubing . . . hard, tough, abrasion-resistant and extremely difficult to dent or damage. Easy to weld.**
- **Combination swept-forward front legs and outriggers are new in concept and design. Permit straddling well-head and cellar. No vehicle uplift at engine end, greater sideways resistance to wind overturn. (Pat. Appl. for)**
- **Eccentric hinge pin at base of lever lift arm permits 18-inch adjustment at crown block for centering over well. (Pat. Appl. for)**
- **Made in 66' and 81' 6" models with 120,000-lb. API hook load capacity, and in 90' and 93' models with 180,000-lb. API hook load capacity.**
- **On 66' and 81' 6" models, entire structure, lever lift leg, starting legs, combination front legs and outriggers and frame are one complete unit for easy mounting on truck, trailer or drive in.**
- **Clean, un-cluttered design with proper placement of mast hinge gives driver perfect visibility . . . eliminates ALL interference with pumping unit and well-head when positioning mast.**



Prevent dog legs—and stop bottom-joint casing failures

Listen in as the author, engineer with one of the world's largest contract-drilling firms, tells how his company has traced down a big cause of such trouble as knocking off bottom joints of intermediate casing, keyseating after coring, and tight hole after rat-holing ahead. Culprit: the sharp dog leg often created in drilling a smaller hole below a larger one. Solution: calculate bit weights which will keep small hole at same angle as large one.

By JEAN GALLON
Engineer with Societe Languedocienne
de Forages Petroliers,
Montpelier, Herault, France



LANGUEDOCIENNE RIG operating in Landes district, Southwest France, like remainder of the company's 25 rigs, now has no troubles arising from drilling small hole below large hole.

LIKE OTHER contract-drilling firms around the world, Societe Languedocienne de Forages Petroliers has had trouble when drilling a small-diameter hole below a larger one. These troubles arise in such operations as drilling below an intermediate casing shoe, "rat-holing" ahead below full-gage hole, and coring with a reduced-size bit.

The troubles take the form of tight spots in the hole, key seats, or the bottom joints of intermediate casing being knocked loose in the hole.

Languedocienne feels it has found the root of much of this trouble and has virtually eliminated it.

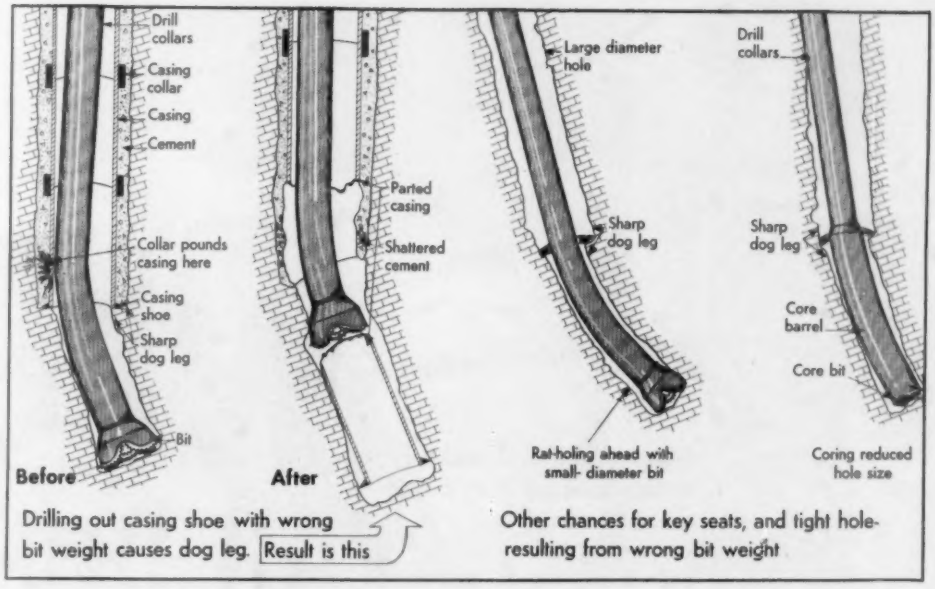
Source of the difficulties was the dog leg created by poor drilling practices when commencing the small hole below the larger one. Carrying the wrong bit weight caused the small hole to drill at a different angle from the larger hole above. Often, the difference in hole angle (the dog leg) was severe enough to cause the troubles mentioned above. In at least one instance, Languedocienne found it necessary to plug back and sidetrack.

The dog legs are now avoided by using hole-deviation charts to figure the weight that should be carried on the bit in the small hole. (Editor's note: the author refers to the hole-deviation charts which appear in the 1954 API Drilling and Production Practice volume and which were constructed by H. B. Woods and Arthur Lubinski. The Oil and Gas Journal carried these charts in its issues of May 31 and June 7, 1954. The same information is available in table form in the AADC's Toolpusher's Manual.)

From the hole-deviation charts, we calculate the weight which should be carried on the small bit to keep its section of hole at the same deviation as the larger hole above. Following are three examples to show how the technique is used.

In southern France. Languedocienne was drilling an 8½-in. hole to 1,639 m. (5,378 ft.) at Charnier-en-Camargue in southern France. Below that depth, hole size was reduced to 5⅝ in. for coring. In the larger hole, 7¾-in. drill collars were used, bit weight was 10 metric tons (22,000 lb.), and hole deviation was 2°.

In the 5⅝-in. hole, the drill collars were to be 4¾-in. o.d. Question then was: What weight should be carried on the 5⅝-in. bit



DRILLING small hole below larger hole is opportunity for quick change in hole angle. If the small bit drills out with the proper weight, the small hole maintains the same angle as the larger hole above; result is a straight (though not necessarily vertical) hole which causes no trouble.

to prevent a severe change in hole angle?

Using the hole-deviation charts, we calculated that weight in the small hole should be reduced to 3 metric tons (6,600 lb.). This weight was indeed carried on the small bit.

As a result, deviation in the small hole was measured at 1° 50 ft. In subsequent drilling there was no difficulty of any kind in this portion of the hole.

Incidentally, the formation dip was known to be 23°. However, this information was not needed in the calculation which is summarized below:

	Large hole (8½-in.)	Small hole (5⅝-in.)
Collar diameter, in.	7¾	4¾
Weight, lb.	*22,000	†6,600
Hole size, in.	8½	5⅝
Hole inclination, degrees	2	2

*Actual; †From chart.

At Audignon. A company rig was drilling a well in March 1958 at Audignon, France. Hole size was 8½ in. down to 2,104 m. (6,903 ft.) where 7-in. casing was set. Below the casing, a 6¼-in. hole was to be drilled. At the start, of course, the drill collars were not in 6¼-in. hole but in the casing, inside diameter of which was 6.37 in. The 6.37-in. figure was the one used in calculations.

In drilling the 8½-in. hole before setting casing, 6⅛-in. collars had been used. In the small hole, 4¾-in. collars were to be used. Weight on bit in the larger hole was 6 metric tons (13,000 lb.) and hole deviation was 7°.

Problem again was to calculate the weight on bit in the small hole to prevent a severe change in hole angle.

From the "Practical Charts," we calculated that to maintain the same equilibrium deviation in the small hole, we must reduce weight to 6,200 lb. Actually, we carried slightly more weight—3 metric tons or 6,600 lb.

As the smaller-diameter hole drilled ahead, hole angle actually increased. It was 7½° at 2,246 meters (7,960 ft.).

After the collars moved downward with drilling, point of their tangency on the hole wall, of course, moved down out of the casing and into the smaller open hole. Then, hole deviation dropped to 6°.

The calculation can be summarized like this:

	Large hole	Small hole
Collar o.d., in.	6⅛	4¾
Weight on bit, lb.	13,000	6,200
Hole size (or casing i.d.), in.	8½	6.37
Hole inclination, (°)	7	7

In Parentis field. In 1955, Languedocienne drilled the 5 Parentis for Esso at Parentis field in southwestern France. Down to 2,230 m. (7,317 ft.), hole size was 8¾ in. At that depth a string of 7-in. casing was set.

Below the 7-in. casing, hole size was to be reduced to 6-in. diameter. However, the value to be used in calculations was not the hole gage but the inside diameter of the casing, 6.37-in.

In the large hole, the drill collars had been 6⅛-in. diameter, and 10 metric tons (22,000 lb.) had been carried on the bit. Hole angle at the 7-in. casing point was 12°.

In our first two examples, the dip was constant. At Parentis, however, the dip increased from a known 20° in the large hole to an estimated 30° in the small hole.

From Practical Charts, we calculated that to maintain the same equilibrium angle of 12°, weight in the small hole must be 5,800 lb. (2.6 metric tons). Actually, the weight carried was between 2½ and 3 metric tons.

Hole deviation did not change. Nor was there any subsequent evidence of a dog leg at this point.

The calculations can be summarized as follows:

	Large hole	Small hole
Collar o.d., in.	6⅛	4¾
Hole size (or casing i.d.), in.	8¾	6.37
Weight on bit, lb.	22,000	5,800
Formation dip, (°)	20	30
Hole inclination, (°)	12	12

Translator's Credit

The Journal is indebted to Arthur Lubinski, Pan American Petroleum Corp., Tulsa, for making available the translation of Gallon's text which was prepared for the AAODC's Crooked-Hole Drilling Subcommittee.

Baroid research has been active in the development

of every major break-through in drilling fluids!

- 8,000 man days of drilling mud research in 1960
- 655 man days of field research in 1960
- 6,000+ man years of field engineering experience

What you *do* see in a Baroid bag is just part of what you get. Behind each product stands technical knowledge gained from over 30 years of field engineering experience. Complete service from mines and plants to the rig makes Baroid the leader in product development and application.

Improved products and services are assured by the most extensive drilling mud research program in existence. New processes and streamlined operations reduce *your* costs.

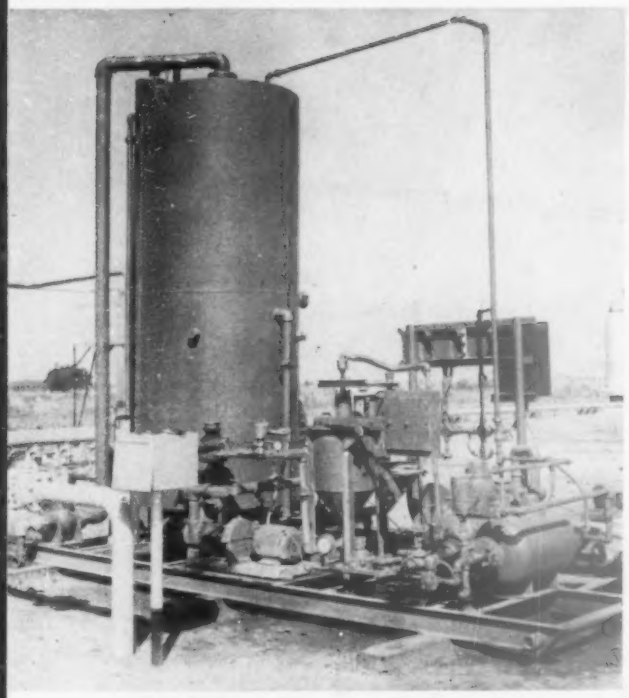
Baroid has had an active part in the major break-throughs in drilling fluids. Baroid will be on the job when future break-throughs are accomplished!

BAROID

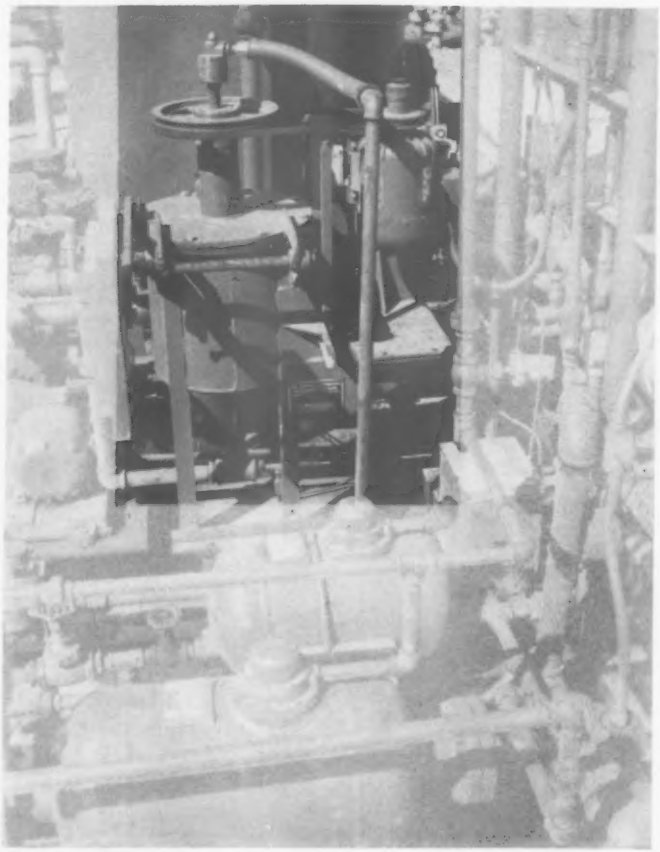
BAROID DIVISION NATIONAL LEAD COMPANY

MAIN OFFICE: P. O. BOX 1675, HOUSTON 1, TEXAS

BAROID -- *Still* Pioneering Drilling Mud Research • Engineering • Marketing



CENTRIFUGAL TREATER on test in South Louisiana. Production units do not contain the large tank on the left, and they have a lower silhouette than this test model.



HEART OF THE TREATING SYSTEM is this electric-motor-driven Sharples centrifuge. Clean oil is discharged through the rotary union and flexible hose connection at the top.

New centrifugal treater passes field tests

Fireless treating and adaption to automatic operation make this unit ideal for offshore as well as for conventional onshore installations.

BY W. B. BLEAKLEY
Production editor

NEWEST THING in treating is a fireless centrifugal treater.

Because of its departure from conventional treater design and operation, the new unit has several advantages:

- No fire is needed, eliminating explosion hazard.
- Oil is not heated, eliminating gravity losses.
- Operating costs are low because no fuel is needed for heating.
- Chemicals are used only as dictated by the system.
- Unit is portable.
- Installation cost is low.
- System is easily automated.

The Axelson - Garrett centrifugal treater uses a principle of dynamic treating for cold separation of emulsified oil and water. The same principle that is used to "grind out" b.s. and w. in oil samples has been applied to the entire stream of oil coming from a well or lease.

But there is more to the unit than just a centrifuge. The completely assembled, skid-mounted unit also contains a feed pump, two p.d. meters, a b.s. and w. probe and monitor, a chemical-injection pump, control panel, and other equipment items. With the addition of a surge tank and associated fittings and equipment, conversion to automatic custody transfer can be made quickly and inexpensively.

Safety. Conventional heater treaters are located a safe distance away from stock tanks and other equipment, that may be in an explosive

atmosphere, because of the firebox used for heating emulsified crude. Additional expense involved in remote location of the treater is not excessive — except offshore where an additional platform may be needed to locate the treater a safe distance from the wellhead.

The new Axelson centrifugal treater is operated entirely by electricity, and all associated equipment can be made explosionproof, so proximity to storage tanks, wellheads, etc., is no problem.

Gravity conservation. Heating increases the vapor pressure of an oil, and some of the light ends are lost due to evaporation. Result is a two-way loss to the producer: (1) by reduction in API gravity, and (2) by reduction in volume.

Amount of loss avoided by **heatless** treating will vary from field to field because of different oil characteristics, so no dollar value can be assigned without study. But there **will** be a saving if evaporation is prevented, and API gravity is maintained.

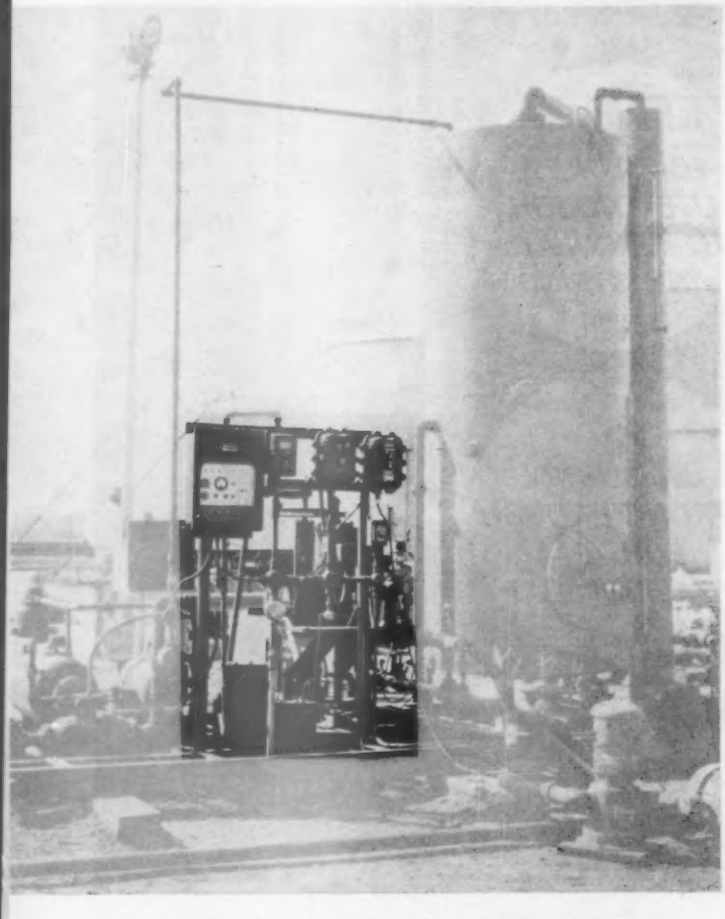
Operating cost. Treating system available now requires only 2½ hp. of electrical energy. Cost of this energy is about 75 cents a day. A gas-fired heater treater could consume up to $3 worth of fuel per day, and this figure could be much higher if LPG is needed.

Chemical cost. Because the complete unit contains a b.s. and w. probe and monitor, the chemical feed pump is energized only as chemical is needed. This eliminates waste, resulting in reduced chemical cost.

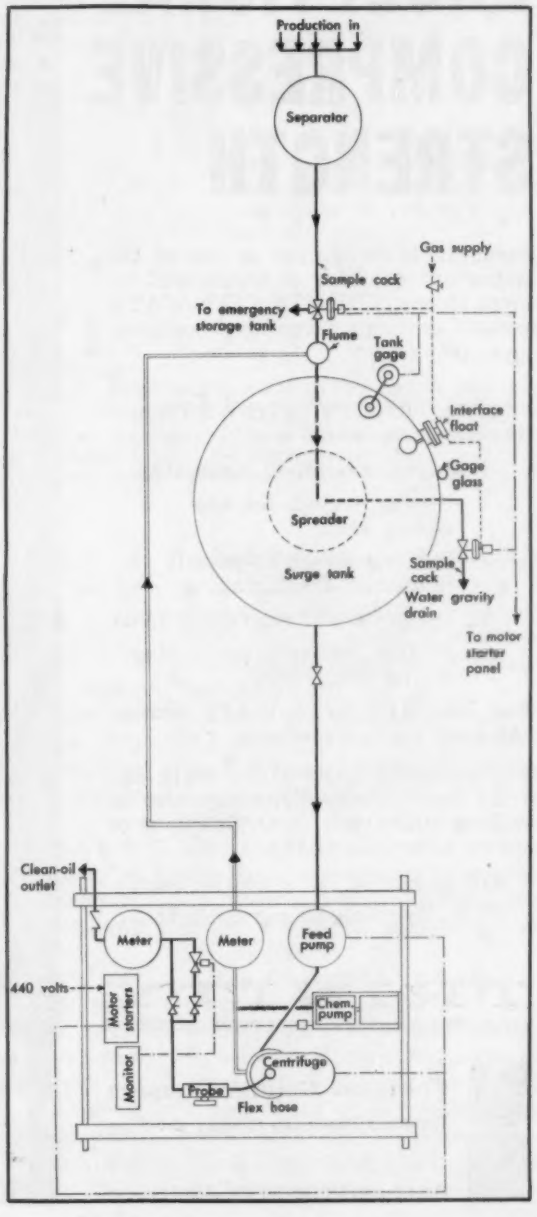
Capabilities. The system has been on field test for about a year, and data collected during that time have provided some operating parameters that are being used in the design of a given installation.

- Maximum viscosity recommended, at minimum operating temperature is 60 S.s.U.
- Minimum API gravity, 30°.
- Maximum liquid input to system, depending on ability of free water knockout, about 600 bbl. per day.
- Maximum liquid input to centrifuge, 400 bbl. per day.

CONTROL PANEL is part of the standard equipment included in the basic system. Among other things, these controls receive signals from the b.s. and w. probe and operate valves and chemical injectors as needed.



LACT conversion is made easily by adding a surge tank and auxiliary equipment on the upstream side of the treater system. This diagram shows the entire package from crude-oil inlet to clean-oil discharge.



Trinity
LITE-WATE

A Complete Low Density Cement with

EXCEPTIONAL COMPRESSIVE STRENGTH

Strength is recognized as one of the important qualities of an oil well cement slurry. TRINITY LITE-WATE cement develops exceptional compressive strengths.

In the range of lightweight cement slurries, TRINITY LITE-WATE produces a slurry which is:

1. Light enough to circulate.
2. Strong enough for any casing seat.
3. Strong enough to permit hydraulic fracturing.
4. Impervious to migrating fluids.
5. Sulfate resistant for lasting casing protection.

For TRINITY LITE-WATE cement call your service company.

For complete Laboratory Data call your local Trinity Representative or write Dallas Office, P. O. Box 2698 or phone RIverside 2-8111.

376 lb. Barrel 94 lb. Sack

75 lb. Dry Volume per cubic foot

TRINITY

PORTLAND CEMENT DIVISION
GENERAL PORTLAND CEMENT COMPANY

DALLAS·FT.WORTH·HOUSTON

- Maximum clean-oil output, 300 bbl. per day.
- Oil output contains 0.5% b.s. and w., or less.
- Sand and paraffin in solution have not caused trouble on field tests.

Operation. Part of the operation of the system will vary, depending on what equipment is installed upstream from the centrifuge system itself.

Assuming that a surge tank is in the line, the feed pump, mounted on the skid, discharges emulsion from the tank to the bowl of the stationary-wall centrifuge. Fluid enters the centrifuge through a tangential nozzle, and the rotating disks of the centrifuge cause all fluid in the bowl to rotate.

Centrifugal force causes the fluid to separate into three layers, water, emulsion, and oil, from the stationary bowl to the center.

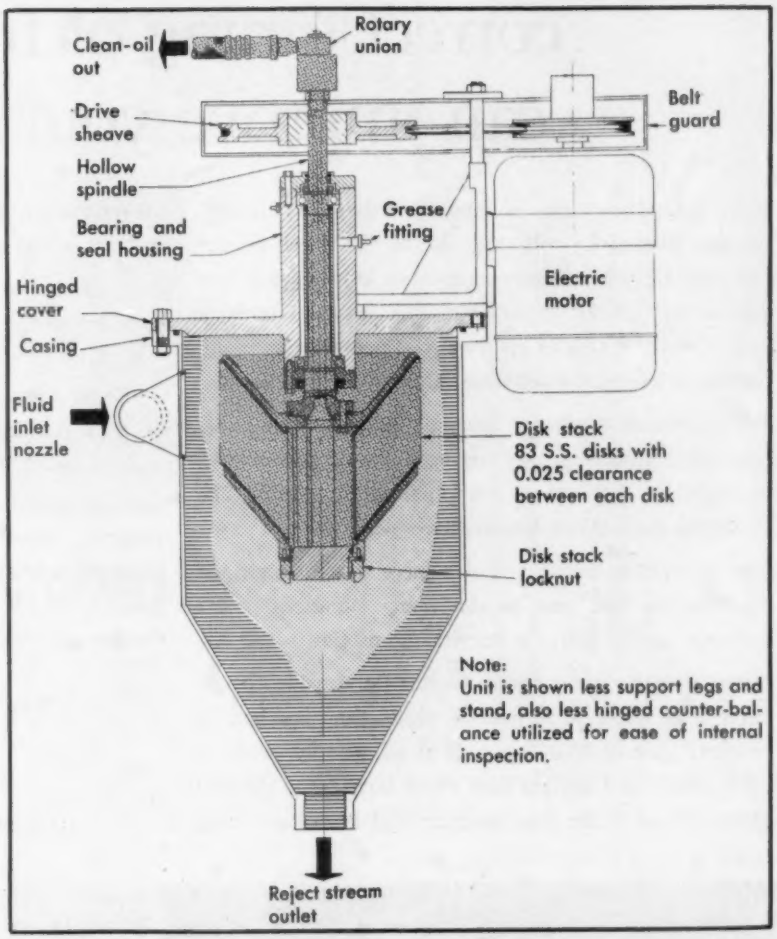
Pipeline oil is discharged through a rotary union and flexible-hose connection at the top of the centrifuge, and the remaining fluids are discharged through the bottom of the bowl and back into the upstream system for further washing.

If the per cent b.s. and w. in the clean-oil stream exceeds a preset amount, the monitor automatically closes a bypass solenoid and simultaneously energizes the chemical-injection pump. The oil-discharge rate is reduced to allow the bowl to become purged of excess water, but enough oil is passed to permit the monitor to detect clean oil when it again starts through the system. This will open up the bypass solenoid, and the system will return to normal operation in a short time.

Cost. First cost of the centrifugal treating system is higher than that of a conventional heater treater. But the new system contains automatic features already described.

The probe for finding b.s. and w. content, and the monitor to handle switching of bad oil and to energize the chemical pump are included in the basic package, among other items.

Installation cost is reasonable since the complete unit is skid-mounted, and the lack of explosion hazard means that long lines to remote locations are not needed. This last feature is of particular interest to the offshore operator where the cost of a separate platform can be saved.



CLEAN-OIL DISCHARGE is through the rotary union at the top of the centrifuge, and the reject stream is discharged through the bottom oulet. Centrifugal force, through the rotation of the disc stack, separates the incoming fluid into the layers shown.

Field Tests

Because the new system represented a radical departure from existing treating methods, field tests were needed to determine the feasibility of centrifuge treating and to determine operating limits:

Test A—East Texas field. Crude being tested had an API gravity of 37° at 60° F. and a viscosity of 44 S.s.U. at 100° F., the natural temperature of the oil.

From May to September 1960, oil was treated at a rate of 300 bbl. per day to 0.1% b.s. and w. Lease production to the system was at a rate of 600 bbl. per day, with the input to the centrifuge, after going through the free-water knockout, containing 10 to 20% emulsion and free water.

Test B — South Louisiana. A crude with a 30° API gravity at 60° F., and a viscosity of 53 S.s.U. at 100° F. was tested. Crude contained approximately 0.2% paraffin and 0.1% sand.

Crude was successfully treated to 0.1 to 0.2% b.s. and w. and no sand at a rate of 300 bbl. per day. Lease production to the system was 600 bbl. per day, with the input to the centrifuge from the free-water knockout containing 5 to 15% emulsion and water. Natural temperature of the oil being treated was 90° to 100° F.

Test C—South Louisiana. Attempts to treat a 25° API crude with a viscosity of 90 S.s.U. at 100° F. were considered unsuccessful. Because of high viscosity, the oil, containing 5 to 30% emulsion and water, could only be treated to 2 to 3% b.s. and w. at 100 bbl. per day discharge rate.

correct timing of frac jobs can improve your profits

More than three years of intensive experience in engineering treatments with the aid of the Frac Guide* has given Dowell engineers an intimate knowledge of how various well characteristics influence results from frac jobs. *Correct timing* of fracture treatments is one of the important lessons learned from this study and experience.

While Dowell engineers are not in the business of reservoir engineering, they *can* help you determine what to expect in the way of payout, folds of increase and treatment costs when you fracture your wells.

The production history shown here of a waterflood demonstrates just one of the many situations where timing of a frac job can be vital to profits.

Notice that the frac program on this flood, which began three years after peak rate of production, resulted in an actual gain of 55,000 barrels of oil. The hypothetical curve shows that the net gain might have been 118,000 barrels of oil if the frac program had been performed 18 months earlier. This would have been 63,000 barrels more than the amount actually recovered.

In addition to increasing recovery, the earlier frac program would have hastened payout and reduced total operating costs. The result would have been greatly increased net profits.

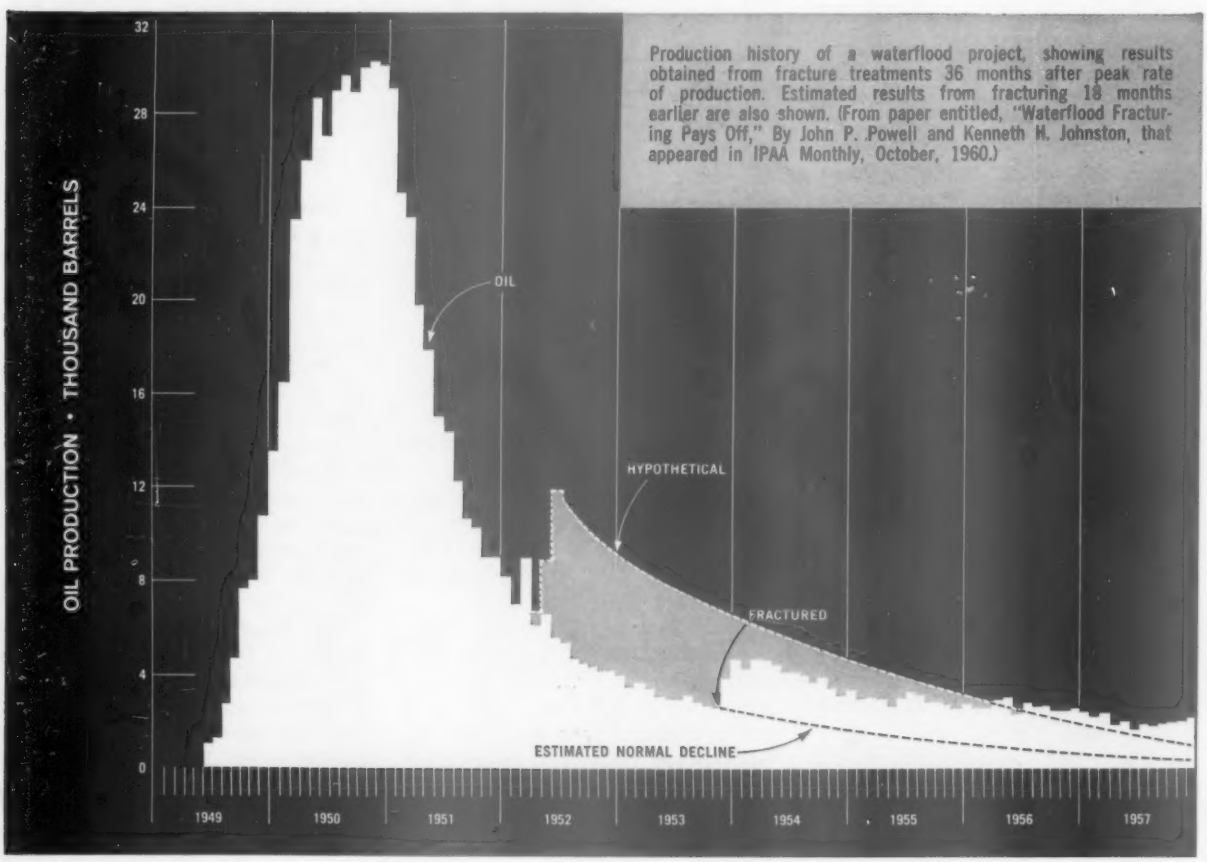
If your decline curves and formation energy records indicate that fracture treatments could help, now is the time to ask Dowell to engineer and compute a treatment program. Don't wait too late. Dowell services and products are available in North and South America, Europe, North Africa, and Iran. Dowell, Tulsa 14, Oklahoma.

*DOWELL SERVICE MARK

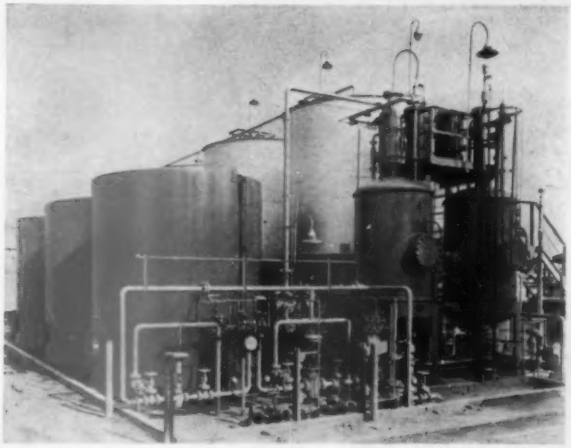
SERVICES FOR THE OIL & GAS INDUSTRY

DOWELL

DIVISION OF THE DOW CHEMICAL COMPANY



Production history of a waterflood project, showing results obtained from fracture treatments 36 months after peak rate of production. Estimated results from fracturing 18 months earlier are also shown. (From paper entitled, "Waterflood Fracturing Pays Off," By John P. Powell and Kenneth H. Johnston, that appeared in IPAA Monthly, October, 1960.)



Fuel dehazer for bulk plants

BULK - TERMINAL treating of furnace oils can be faster than at present with a new and compact electric dehazer that has been brought out as the product is designed to eliminate the storage time usually necessary to permit settling.

The maker says the device removes water, solids, and residual caustic or acid from fuel oils and provides a haze-free product immediately prior to shipment. Using an electric precipitation principle, the dehazer operates automatically and at ambient temperature.

It has no moving parts, requires no steam or filtering elements, and can handle a wide range of water in the fuel. Both dual-vessel units as illustrated and single-vessel units are available. Source: **Petrolite Corp., Petreco Div.,** Box 2546, Houston 1, Tex.

Plastic pipe fittings and flanges

THESE Schedule 40 and 80 pipe fittings and flanges made of unplasticized polyvinyl dichloride are available in sizes from ½ to 2 in. Made by an injection-molding process, they are expected to find use along with the maker's Geon thermoplastic pipe for process piping handling hot corrosive liquids, including strong alkalies and acids.

The Schedule 40 pipe safely handles a pressure of 125 psi. at 185° F. and maintains its mechanical strength while carrying hot fluids, the maker says. Source: **Tube Turns Plastics, Inc.,** 2929 Magazine, Louisville 11, Ky.

Want more facts about equipment or copies of product literature described in this issue?
Send this coupon
to manufacturer at address shown after each item.
Product name, Model no., literature title or number: ---

Described in OIL AND GAS JOURNAL-Issue of November 13, 1961
NAME --- TITLE ---
COMPANY ---
ADDRESS ---
CITY --- STATE ---

Kit speeds meter tests

Field tests of mass flow meters can be made without taking the meter from the line with this new kit that consists of weights, lever, pulley, stopwatch cord, and data record cards. Meter users can thus check their mass flowmeters when-

W. C.
NORRIS
SUCKER RODS
UNDERCUT PIN
ROLLED THREAD
Immediate Delivery All Grades in Sizes
1/2"—5/8"—3/4"—7/8" and 1"
For detailed information see your W. C. Norris sales representative or write for brochure entitled "What About Undercut Pins and Rolled Threads".
Norris continues to furnish conventional API threaded pins in sizes up to 1 1/8".

Target → Longer Service

TYPE 30 Carbon-Manganese fully normalized. For heavy duty where corrosion is not a major problem.

TYPE 40 Nickel-Molybdenum Alloy. Normalized and tempered. For heavy duty pumping in medium corrosive conditions.

TYPE 75 Nickel-Chromium-Molybdenum Steel, normalized and tempered. For extremely heavy duty in medium corrosive fluids.

TYPE 78 Carbon-Chromium-Molybdenum Boron Alloy, normalized and tempered. For heavy duty pumping in non-corrosive or inhibited fluids.

Write for prices and complete literature today!

★ **BUY FROM YOUR NORRIS DISTRIBUTOR**

NORRIS QUALITY
SUCKER RODS
POLISHED RODS — COUPLINGS

W. C. NORRIS DIVISION

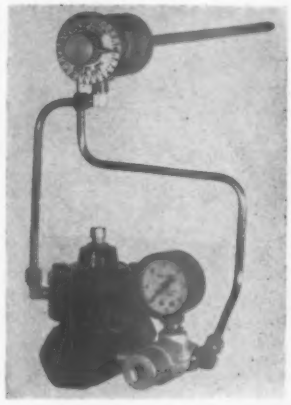
DOVER CORPORATION

P. O. BOX 1739 • TULSA, OKLA.

BRANCHES: Great Bend, Houston, Kilgore, Odessa, Wichita Falls, Salem, Casper, Farmington

ever they wish to know their calibration, with the kit. The kit also offers a way for users to obtain calibration data specific to their process fluids. Source: **General Electric Co.,** Schenectady 5, N. Y.

•

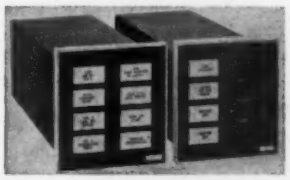


Throttling thermostat for heaters

A bimetal thermostat is now on the market that provides complete throttling action for direct-fired heaters. The controller consists of a spring-loaded motor valve with a characterized inner valve, a sensing element for a temperature range of −30° to 400° F., and a pop valve to prevent excessive burner-manifold pressures.

Maximum supply gas pressure needed is 25 psig., and maximum sensing-element working pressure within the separable socket is 4,000 psig. Source: **Kimray, Inc.,** 52 NW 42nd, Oklahoma City, Okla.

•



Solid-state annunciator

This new miniaturized solid-state annunciator is designed so that each circuit, including lamps and light box, is contained in a single channel-mounted module which is plugged into cabinets having either 2 by 3 or miniature ¾ by 1½-in. nameplates. All electronic components are mounted on a rugged etched circuit board.

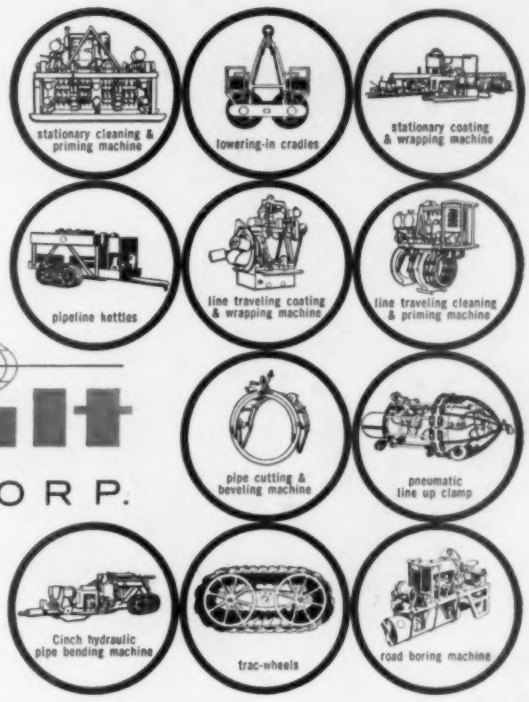
STOP H_2S CORROSION BEFORE IT STARTS!

• The Connelly IRON SPONGE purification process at the well site removes hydrogen sulphide BEFORE the gas is piped to central processing. Thus, the cause of pipe line corrosion is eliminated because corrosive gas never enters the transmission lines. Additionally, Connelly IRON SPONGE eliminates the need for extreme close control. It operates with high efficiency at low or high pressures—absorbs more H_2S, gives longer service between foulings and is easily regenerated. If you have a purification problem check this MOST ECONOMICAL solution today. Write for Field Processing Bulletin #OG-7.

CONNELLY, Inc.
3164 SOUTH CALIFORNIA AVENUE
CHICAGO 8, ILLINOIS
ELIZABETH, NEW JERSEY

MOST COMPLETE PIPELINE EQUIPMENT SOURCE IN THE WORLD

Crose-Perrault is the world wide leader in pipeline equipment, materials and supplies. Thousands of miles of pipeline experience with pipeline contractors throughout the world have earned Crose-Perrault this world wide leadership because of proven equipment, engineered and designed to deliver long term performance under the toughest conditions with maximum efficiency. Everything you need in pipelining from heavy equipment to miscellaneous supplies can be obtained by contacting Crose-Perrault . . . the most complete pipeline equipment source in the world.


stationary cleaning & priming machine
lowering-in cradles
stationary coating & wrapping machine
pipeline kettles
line traveling coating & wrapping machine
line traveling cleaning & priming machine
pipe cutting & beveling machine
pneumatic line up clamp
Cinch hydraulic pipe bending machine
trac-wheels
road boring machine

Crose perrault
EQUIPMENT CORP.

2765 Dawson Road • Phone WEbster 6-2171 • Tulsa, Oklahoma • BRANCH OFFICES: Houston, Texas • Elizabeth, New Jersey • IN CANADA: CROSE-PERRAULT CANADA, LTD., Edmonton, Alberta • Toronto, Ontario • EXPORT OFFICE: New York, N. Y., • CABLE ADDRESS: CROSE

Advanced new ultrasonic test head, photographed in the research laboratory.

No. 2 PROGRESS REPORT TO PIPELINERS:

Developments in ultrasonic inspection of line pipe

Prototype of a new system of nondestructive testing has been operating in one Republic pipe mill since 1958. The system inspects the complete length of pipe, automatically, with both high-frequency sound waves and induced eddy currents.

Development of this dual system has produced significant advances in the art of ultrasonic pipe inspection. Research has uncovered these facts: the advantages of immersed testing *can* be obtained in a direct-contact type test head . . . unwanted sensitivity to harmless variables in the weld area *can* be eliminated by proper test head design and electronic circuitry . . . there is a better ultrasonic beam angle than 45°.

Republic's goal is *total* reliability in line pipe—to give you the greatest possible line pipe safety and economy. Prototype sonic-electromagnetic equipment, has tested thousands of tons of Republic Electric Resistance Weld Line Pipe. This equipment is expected to be in use on all Republic Pipe mills in the near future.

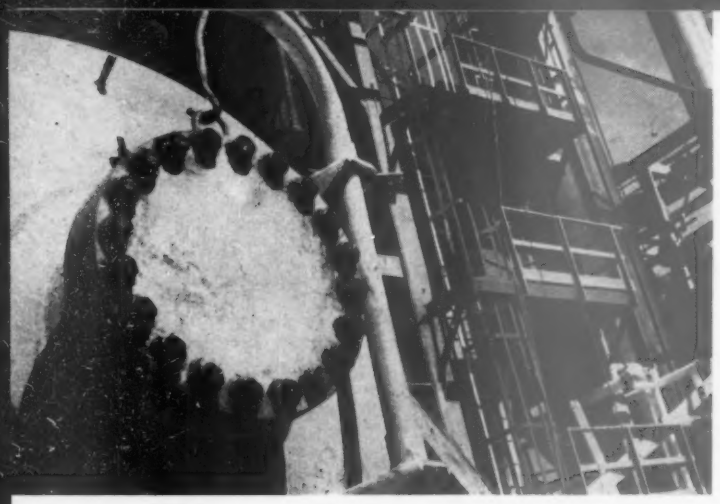
Steel
Strong
Modern
Dependable

REPUBLIC FUSION WELD in 60- or 30-foot lengths offers constant circumference, uniform wall thickness, and accuracy of size. Inner and outer seams and walls undergo rigorous electronic inspection. Available in 24" through 30" O.D., Republic Fusion Weld is hydraulically expanded and hydraulically tested. Contact your nearest Republic representative or mail the coupon on the following page for complete information.

REPUBLIC STEEL

Cleveland 1, Ohio

Electric Weld • Seamless • Continuous Butt Weld • X-TRU-COAT
Plastic Pipe • Light Wall • Fusion Weld



FOR GREATER RELIABILITY...

PRECISION HEAT TREATMENT in the manufacture of Republic Alloy Steel Studs and Hex Nuts reduces the danger of creep, stretch, or fatigue failure. Studs for high temperature service are normally supplied in AISI 4140 Chrome-Moly Steel, heat treated to ASTM A193, designation B-7, or in designations B-14 and B-16. Nuts can be pulled up tight yet backed off quickly to meet maintenance requirements. Send for booklet listing types, sizes, and specifications.

PIONEER NATURAL GAS COMPANY selected 2" Republic SRK Plastic Pipe for the job of bringing natural gas to Washburn, Texas. A semi-rigid plastic pipe, SRK is immune to oxidation, electrolytic action, and ground chemicals. Uniform roundness and concentricity assure tighter joints . . . maximum strength at all points. Available in ½" to 8", Republic SRK is produced from virgin A.B.S. resins. Mail coupon for details.

DESIGN SMALLER CROSS SECTIONS to carry heavier loads by utilizing Republic Alloy Steels. Exceptionally high strength-to-weight ratios assure greater resistance to shock, abrasion, and fatigue. Alloy steel extends equipment life, reduces downtime, and overall costs. Republic field metallurgists help you select and apply the most desirable type—for drill bits, drill collars, tool joints, tongs, Kelly bars, blocks, sucker rod couplings, gears, shafts, and other equipment. Return coupon for data.

REPUBLIC STEEL CORPORATION
DEPT. OG-2777
1441 REPUBLIC BUILDING • CLEVELAND 1, OHIO

Please send more information on:
- ☐ Electric Weld Line Pipe
- ☐ Republic Fusion Weld Pipe
- ☐ Alloy Studs and Hex Nuts
- ☐ SRK® Plastic Pipe
- ☐ Alloy Steel and Metallurgical Service

Name_____ Title_____

Company_____

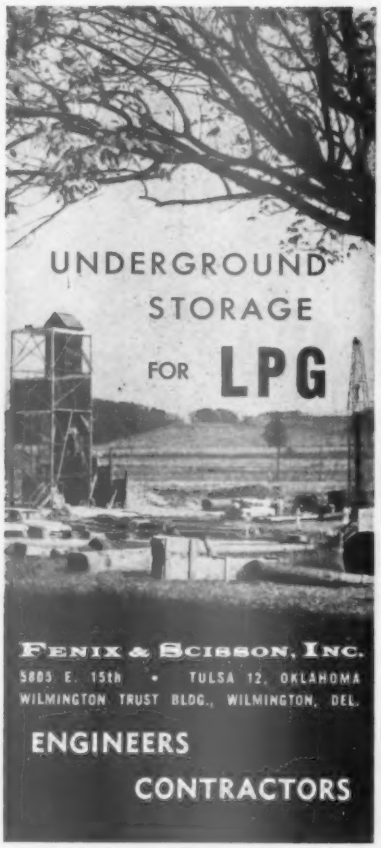
Address_____

City_____ Zone____ State_____

REPUBLIC STEEL

REPUBLIC HAS THE FEEL FOR MODERN STEEL

Strong, Modern, Dependable



THIS FILE HOLDS
2000 ELECTRIC LOGS

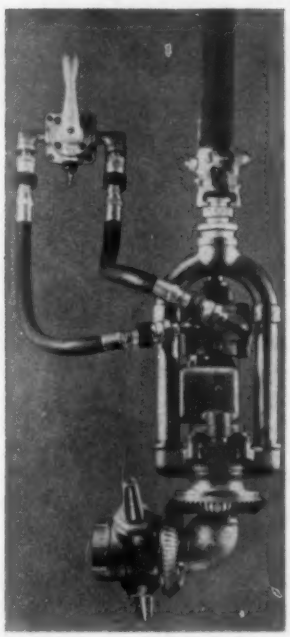
KRAFTBILT E-24 holds 2000 full-sized logs (Schlumberger, Lane-Wells, Halliburton or others). Separate follow-blocks in each drawer give eight drawer efficiency. Extra-strong extension for fingertip control, easy sliding. Fire resistant all-steel construction.

Other electric log file cabinets available — also custom-made file folders and dividers for greatest efficiency.

For CATALOG 59-B, write:
Dept. J-449

ROSS-MARTIN COMPANY
P.O.BOX 800 TULSA 1 OKLAHOMA

Two operational sequences are available: automatic reset or manual reset to normal after acknowledgement of an alarm. The Miniature Model 360 annunciator plug-in module measures only ¾ by 1½ by 10 in. Two types of cabinets are available. The basic cabinet requires a panel area of only 5 by 5 in. and will house eight plug-in modules. Power for the annunciator may be either a.c. or d.c. A power converter provides the regulated d.c. voltage required. Source: **Thomas A. Edison Industries, McGraw-Edison Co.**, 61 Alden, West Orange, N. J.



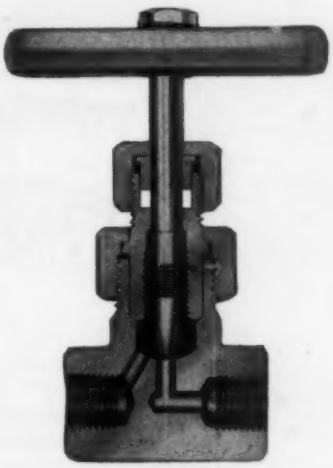
Jet unit cleans tanks fast

A reversing feature on this reversible Rotor Jet unit for cleaning tank interiors is claimed to double the unit's cleaning effectiveness by providing a thorough cleaning pattern. Operation is automatic.

Perhaps the outstanding feature of the unit is that personnel need not enter a tank to clean it, which is particularly important when toxic or explosive vapors are present. The cleaning unit is balanced so that it can be lowered into a tank while suspended only by the hose. No extra support is needed. The maker claims the unit will then scrub every square inch of the tank's surface.

The length of the cleaning cycle ranges from 10 to 30 minutes. It

AMERICAN®
NEEDLE
VALVES



Handle the toughest meter manifold jobs and corrosive field services. Eliminate gland leaks.

Teflon-packed forged steel American Needle Valves stand up under all conditions. Stainless or carbon steel precision-machined valve bodies are ideally suited for welding. Stainless steel centerless-ground valve stem simplifies valve repacking under pressure.

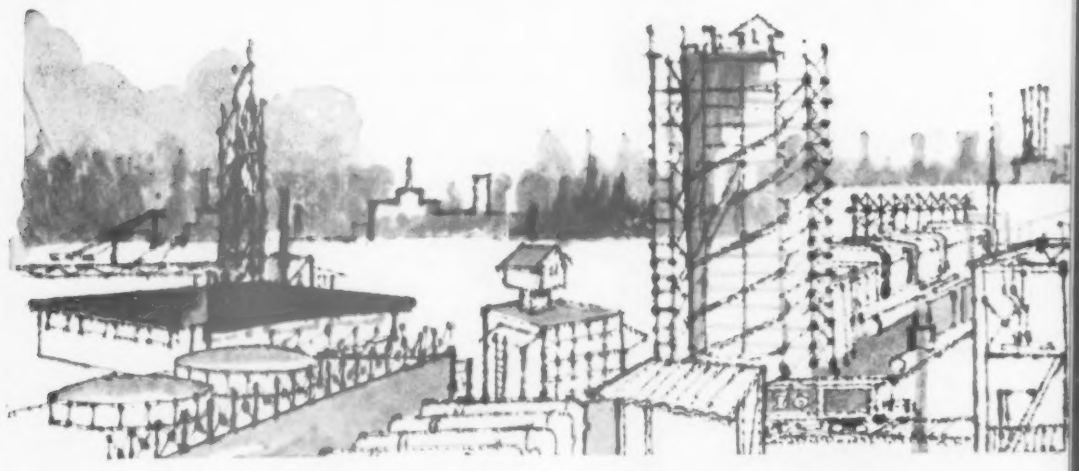
Standard valves design-rated for pressures to 5,000 psi at 70°F. Hydrostatically tested to 10,000 psi (twice rated working pressure) and individually inspected on request. Furnished with graphite-impregnated asbestos packing for temperatures above 450°F. Angle or straight patterns — screwed or union bonnets.

Write for Bulletin 420.

AMERICAN METER COMPANY

Sales Offices in Principal Cities

ENGINEERING AT ITS BEST



WHAT YOU SHOULD EXPECT

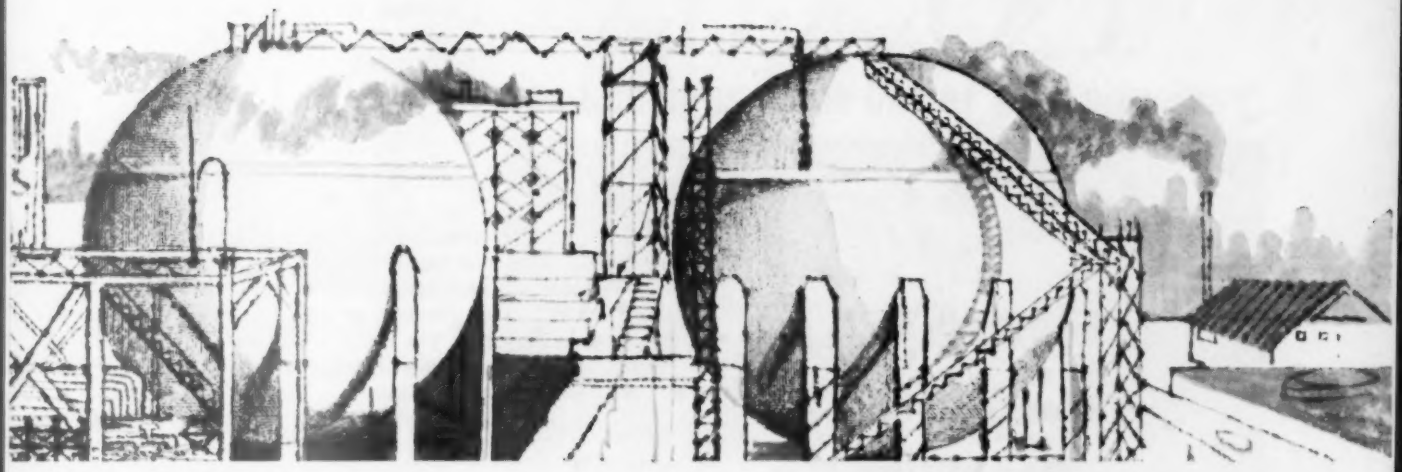
When you go to an engineering firm for help in the design and construction of a new plant, or the expansion of existing facilities, you have a right to expect certain basic standards from that firm. They should have EXPERIENCE, for only with past experience can you minimize the number of new problems which will arise on any new project. Such experience, however, should be tempered with FLEXIBILITY, CREATIVITY and VISION. Some companies are experienced beyond measure at building plants from designs more than 25 years old. In the highly competitive years ahead, such plants could prove economically unsound. You owe it to your company's future to select a firm which has proven its ability to provide the newest and the best in process engineering.

For almost half a century, CHEMICO has maintained a reputation for progressive and imaginative process design and improvement. This proven "know-how" is available to firms in the chemical and petrochemical fields requiring any and all types of engineering and construction services.

WAYS OF WORKING WITH THE CLIENT

A recently completed petrochemical plant offers the best example of the several ways in which CHEMICO is prepared to work with its clients. This huge complex was designed to produce acetylene derivatives, and included processes for producing a wide range of basic chemicals. The ammonia, sulfuric acid and ammonium sulfate sections of this plant were based on *Chemico's own proprietary processes.* The designs for the acrylonitrile and hydrogen cyanide units were based on processes developed in the *client's own pilot plant.* For the acetylene plant, CHEMICO *obtained a license* from BASF in Germany for their patented production-proven process. The oxygen plant was designed by the Linde Company of Germany on a *sub-contract basis.* CHEMICO's Construction Department was responsible for erection of all the plants, and CHEMICO's Industrial Projects Department supervised, coordinated and controlled the entire project.

CHEMICO is always prepared to provide its services to clients on any or all of the bases indicated above. For clients with processes of their own, CHEMICO's Industrial Projects Department will engineer and construct plants, starting at any stage of development. CHEMICO's own laboratories and pilot plant are available, if desired, for process development and improvement work on a contract research basis. If the process to be employed has already undergone pilot stage testing, CHEMICO will design the most economic and efficient commercial scale operation. In such a case, the client can be sure that CHEMICO will call on the services of outstanding engineers and technical personnel with experience similar, or related to the unit operations which are to be designed, engineered and constructed. In addition, the client can be assured that CHEMICO, as an independent engineering organization, will undertake such activities in the framework of a completely confidential relationship,



with all necessary safeguards for protecting the client's competitive position in regard to trade secrets and research developments.

In the case of clients who want plants to produce products for which neither CHEMICO nor the client has a process, CHEMICO, through its Industrial Projects Department, will obtain licenses from whatever source possible for production-proven process designs which will enable the engineering and construction of the desired plant.

Very often CHEMICO's drafting force as well as its specialists in civil engineering, mechanical engineering, electrical engineering and other service engineering capacities can be made available to clients on an individual contract basis. CHEMICO's construction organization, made up of a permanent force of highly experienced construction superintendents, is prepared to undertake a wide range of erection projects related to the process industries.

CONTRACT ARRANGEMENTS

CHEMICO offers its clients a wide choice in the type of contract under which each individual project is to be handled. Among the more common arrangements—although by no means the only ones available—are the following:

Cost Plus Fixed Fee: Under this type of contract, CHEMICO's fee and overhead charge for engineering, construction and related services is decided by mutual agreement, and the client is billed at direct cost for any and all expenses incurred by CHEMICO to complete the client's project.

Lump Sum: At the client's request, CHEMICO submits a firm estimate containing a specific price for which CHEMICO will undertake to complete the client's project.

Guaranteed Maximum: Under this type of contract, CHEMICO will set a maximum cost to the client for an individual project. If the cost of the project falls below the maximum figure, all savings will be divided between CHEMICO and the client on the basis of a prearranged rate.

Fixed Price Equipment Supply: Under this type of contract, the client gets the benefit of CHEMICO's design, engineering, purchasing and expediting services, but is free to make his own arrangements for the construction of his project.

Basic Design and Construction Supervision: This type of arrangement has proved extremely useful in dealing with clients outside the United States. Ordinarily, under a contract of this sort, CHEMICO provides the basic engineering for a project, and the client makes other arrangements for the detailed drawings and construction. CHEMICO then supervises construction and sees the project through start-up operations.

CHEMICO

CHEMICAL CONSTRUCTION CORPORATION

320 Park Avenue, New York 22, New York

CHICAGO • DALLAS • PORTLAND, ORE. • TORONTO • LONDON • PARIS • JOHANNESBURG • TOKYO

DE LAVAL

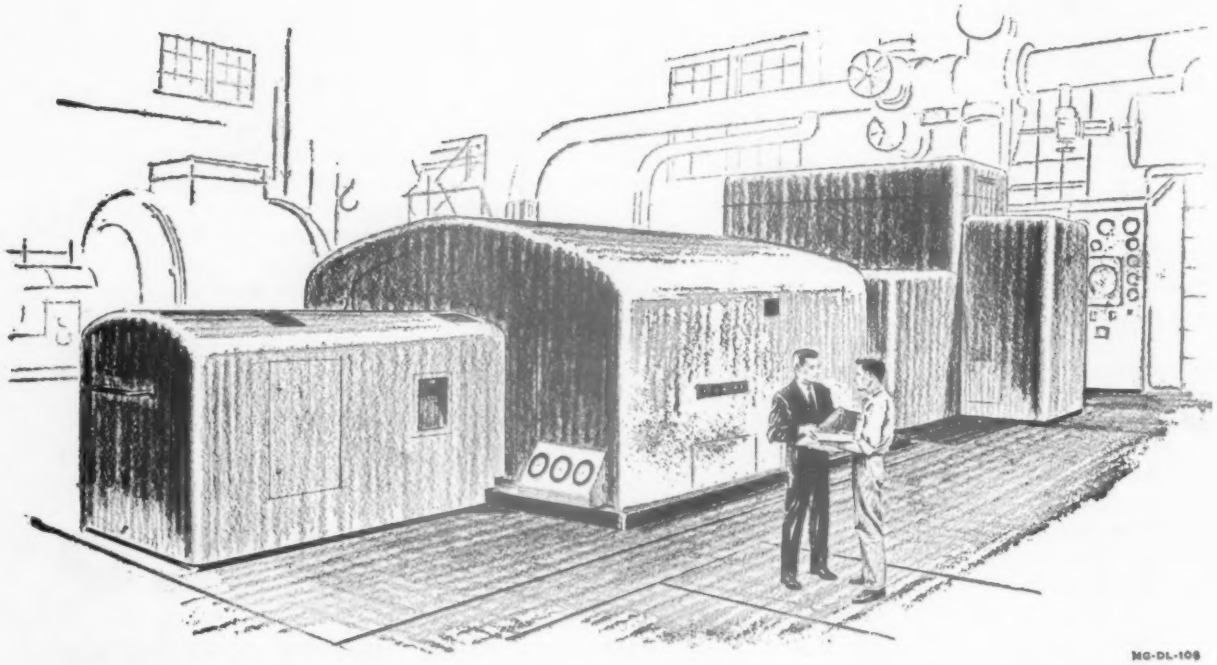
engineered flexibility lets a turbine "grow"

With his eye on tomorrow, a major food processor gave De Laval unusual requirements. He wanted a turbine that would meet today's power and process steam needs . . . and be capable of almost doubling its output in the future. The result: a De Laval turbine to which five additional stages can be added in the customer's plant.

Present capacity of this unit is 5,000 kilowatts which will be raised to 9,375. For future operations, steam pressure and temperature will also be sharply increased.

Whether you need a turbine that can "grow" or have other problems involving heavy rotating machinery, De Laval engineered flexibility can help.

De Laval Steam Turbine Company, Trenton 2, N. J.



MG-DL-108

DE LAVAL • 60 YEARS OF CREATIVITY AND QUALITY

CENTRIFUGAL PUMPS AND COMPRESSORS • TURBINES • IMO® ROTARY PUMPS AND HYDRAULIC MOTORS
MARINE PROPULSION AND AUXILIARY EQUIPMENT • HELICAL AND EPICYCLIC GEARS • TURBOCHARGERS

can be repeated for difficult jobs. Hot or cold rinses can be used. Compressed air at a pressure of 60 psi. and at flow rates of 5 to 15 c.f.m. is used to rotate the cleaning head. Source: **Sellers Injector Corp.,** 1600 Hamilton, Philadelphia, Pa.

•

Chain drives mud pump

A high-speed quadruple roller chain is used instead of a herringbone gear to drive a new 5 by 6½-in. duplex reciprocating mud pump, the Model FM-45, now on the market. The power end of the pump is a one-piece unit with integral eccentric shaft and jackshaft bearing supports. The fluid end of the pump is a one-piece casting with conventional type of pot valves.

A lubricator packing gland lubricates the piston rods at the points of greatest wear. Made of one-piece steel, the connecting rods have renewable steel-backed bushings for the eccentric bearings and brass cross-head bushings. Source: **George E. Failing Co.,** 424 E. Broadway, Enid, Okla.

•

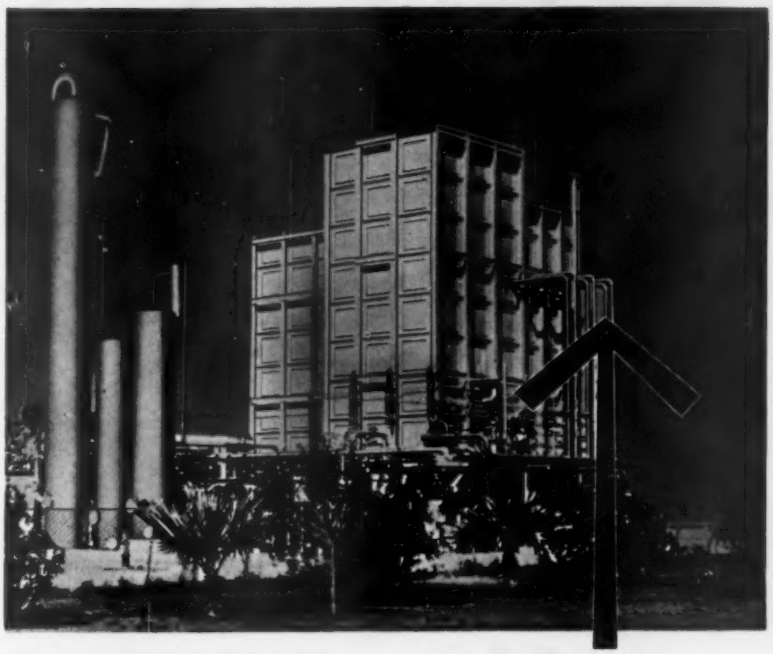
New automatic drilling control

A number of noteworthy features are claimed for a new automatic drilling control, called the Drillmaster, compared with older controls. They include a steadier rate of penetration through all types of formations from extremely hard to soft and elimination of human error in weight control on the drill bit.

The control consists essentially of a combination of components to lift the drilling-rig brake handle a small

from ALCOA

good designs made better with aluminum



Alcoa Aluminum stands up at cryogenic temperatures in oxygen plant designed and manufactured by Air Products, Inc.

At this oxygen plant built by Air Products, Inc., Allentown, Pa., for production of organic chemicals, aluminum was the logical material for construction of cryogenic equipment. ALCOA® Aluminum alloys have the ability to maintain ductility and resistance to shock loading at extremely low temperatures. In fact, tensile and yield strengths actually improve in the cryogenic ranges without embrittlement. Add low cost and ease of fabrication—small wonder that aluminum is preferred for low-temperature process vessels and transportation equipment. The coupon will bring you more information.

ALCOA ALUMINUM
ALUMINUM COMPANY OF AMERICA

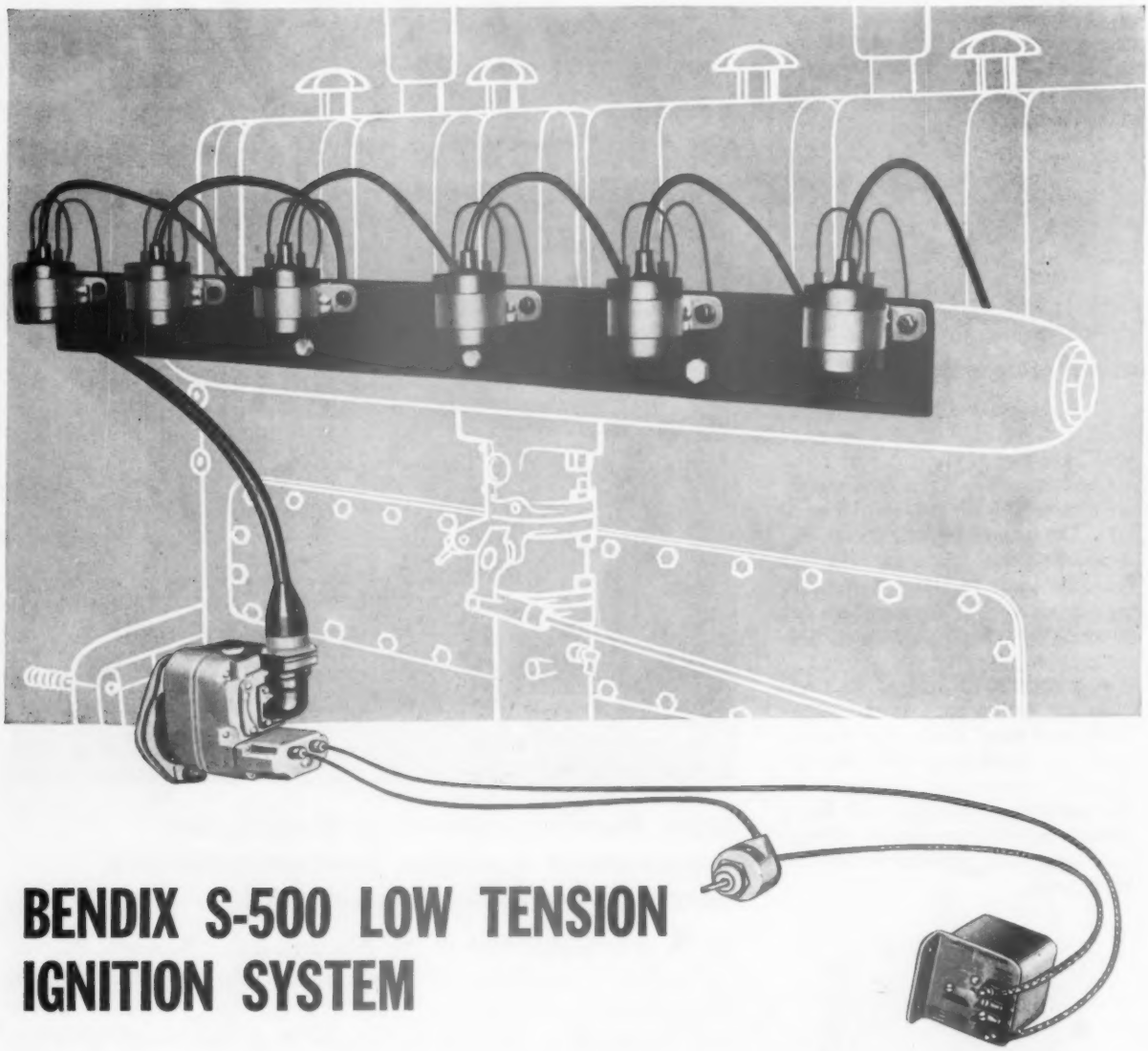
Aluminum Company of America, 826-L Alcoa Building, Pittsburgh 19, Pa.

Please send me the following literature covering Alcoa Aluminum for tubular products and other uses in the process industries.

☐ 68-10460 Process Industries Applications of Alcoa Aluminum
☐ 88-11251 Cryogenic Applications of Alcoa Aluminum

Name_____ Title_____
Company_____
Address_____
City_____ Zone_____ State_____

The latest for small-to-medium industrial engines



BENDIX S-500 LOW TENSION IGNITION SYSTEM

The S-500 System provides the ultimate in starting and operating efficiency for your four, six, and eight cylinder industrial engines. Specify the new Bendix[T.M.] S-500 Low Tension Ignition System. It features "the modern starting concept"—retard breaker magneto and starting vibrator system.

This complete Low Tension Ignition System—including transformer coils, wiring cable assembly, starting vibrator, ignition and starting control switch, and retard breaker magneto—is custom-engineered to assure positive ignition at all cranking speeds and varied retard requirements. It is furnished in base or flange mounting, flameproof and radio shielded, is adaptable for manual or automatically controlled installations.

The S-500 Series, either base or flange mounted, is supplied with the following features:

S-500 Standard Shielding, adjustable drive assembly.
S-501 Standard Shielding, adjustable impulse coupling.
S-502 Super-shielded, adjustable drive assembly.
S-503 Super-shielded, adjustable impulse coupling.
S-504 Standard Shielding, retard breaker, adjustable drive.
S-505 Super-shielded, retard breaker, adjustable drive.

For additional information concerning the best Bendix Ignition System for your particular engine requirements, write us at Sidney, N. Y.

TRADEMARK

Export Sales and Service: Bendix International, 205 E. 42nd St., New York 17, N. Y.

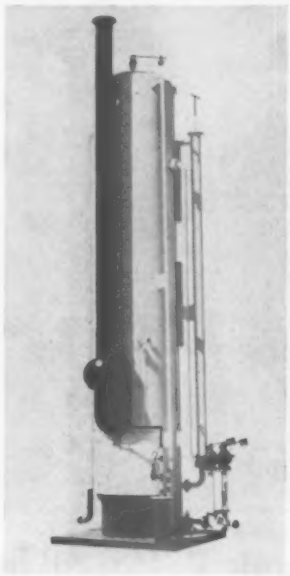
Scintilla Division

THE Bendix CORPORATION

amount at the right time to keep a preset load on the drill bit. The four components are the sensing unit, receiver, brake control, and safety governor.

The sensing unit is a hydraulic diaphragm attached to the dead line which transmits a pressure change as the dead-line load changes. The receiver consists of a pressure tube with adjustable contacts. The bourdon tube, when it receives a pressure change from the sensing unit, opens or closes contact points which permit flow of current to a magnetic clutch in the brake control. The brake control consists of a ¼-hp. motor that drives a hydraulic transmission connected to the magnetic clutch. Source: **Bowen Itco, Inc.,** Box 4587, Houston, Tex.

●



Treater hooked up quickly

Field hookup costs should be virtually at a minimum with a new emulsion-treater design now available which comes with a reinforced-concrete, steel-plated base as an integral part of it. Compared with conventional bases, the integral base is expected to give more stability.

Designed as an integral treater that requires no accessories in the field, the treater is delivered horizontally on its skid, which also serves as a ladder, and is placed upright at the location. The emulsion line from the field is connected into the ground-level inlet on one side while the oil, water, and gas outlets are connected at ground level on the opposite side.

from ALCOA

good designs made better with aluminum

Allied Chemical Corporation stores nitrate fertilizer solutions in Eaton tanks

Made by Eaton Metal Products Corp., Omaha, Nebr., scores of Alcoa® Aluminum stationary tanks store ammonium nitrate fertilizer solutions throughout the country for Allied Chemical Corp. Produced by Eaton for the same cost as coated steel, these tanks require no maintenance; lighter weight means they're easier to ship and install. Ideal for handling nitrogen fertilizer solutions, aluminum resists attack by ammoniated ammonium nitrate. For more information about aluminum tanks, pressure vessels, tank cars and piping, please send the coupon.

ALCOA ALUMINUM
ALUMINUM COMPANY OF AMERICA

Aluminum Company of America, 826-LL Alcoa Building, Pittsburgh 19, Pa.

Please send me the following literature covering Alcoa Aluminum for tubular products and other uses in the process industries.

☐ 34-10197 *Aluminum Pipe and Fittings*
☐ 68-10460 *Process Industries Applications of Alcoa Aluminum*
☐ 42-20849 *Resistance of Aluminum Alloys to Weathering and Resistance of Aluminum Alloys to Chemically Contaminated Atmospheres*

Name_____ Title_____

Company_____

Address_____

City_____ Zone____ State_____

the SWENCH® is a wrench like no other — and will work where no other can. It's the world's first manual impact wrench. Loosens frozen nuts and bolts in seconds . . . tightens with precise accuracy every time. SWENCH is completely portable . . . needs no outside power — yet multiplies torque many times. It safely handles more bolt sizes than any comparable power wrench, but costs less. Read how you'll save with the SWENCH:

SWENCH® cuts man-hours on Bayway Refinery jobs

At Humble's Bayway Refinery, there are a lot of tough bolt and nut loosening jobs — and there are SWENCH wrenches in all tool cribs!

For over three maintenance-free years, SWENCH has been loosening bolts and nuts exposed to heavy coking, prolonged exposure to high temperature and corrosion. Typical savings with the SWENCH — 14 man-hours removing 28 big bolts on the yoke and gear of a Chapman gate type valve. Comparable savings on loosening 2" studs on heat exchangers and product coolers.

The amazing SWENCH works anywhere, carries its power built-in. Exerts many times the energy needed to pull the handle, smoothly and evenly: gives you more power with greater safety.

Six models cover bolt sizes from ½" to 2½". For the full story on SWENCH, how it works, what it costs, how it saves, see your local distributor, or write:

AD NO. 32-37

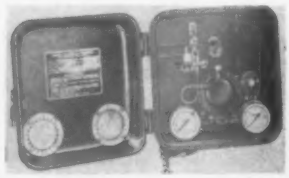
A FEW DISTRIBUTOR TERRITORIES ARE STILL AVAILABLE

DISTRIBUTED IN CANADA BY:
CANADIAN CURTISS-WRIGHT LTD
TORONTO & MONTREAL CANADA

MARQUETTE DIVISION
CURTISS-WRIGHT
CORPORATION
1145 GALEWOOD DRIVE • CLEVELAND 10, OHIO

Components of the treater include 3-in. oil and water dump valves, 2-in. regulator, seamless fire tube, baffling arrangement for emulsion breaking, shielded sight glasses, volume bottle, fuel-gas shutoff, and outside adjustable siphon. Source: **Shelton Equipment & Machine Co.,** Inc., P. O. Box 2767, Amarillo, Tex.

•



Liquid-level control pilots

Two types of action are available on this liquid-level control pilot designed for oil-production service: snap action and throttling action, with or without a relay. The pilots can be used to control liquid level in separators, tanks, knockout drums, heater-treaters, and related equipment.

The snap-action pilot provides on-off control and is particularly suited where sand or other impurities entrained in crude oil may cause rapid wearing of trim parts on throttling type of valves. The throttling pilot is normally used when flow is being metered, or on less-severe operating conditions. The pilots have a filter-regulator in the supply inlet which permits use of wet natural gas as the operating medium. Source: **Fisher Governor Co.,** P. O. Box 307, Marshalltown, Iowa.

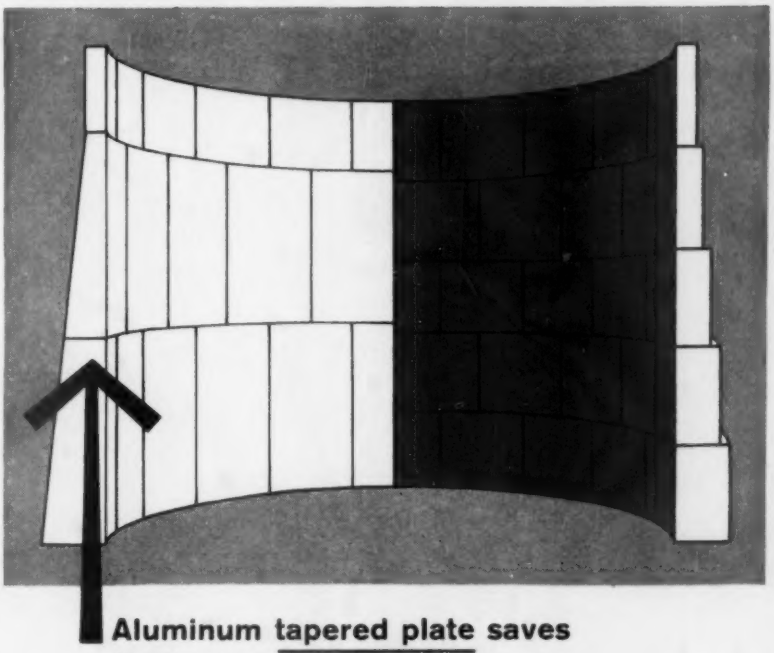
•

Kit simplifies water tests

The amount of hydrogen sulfide in water and oil-field brines can be determined with a new compact kit now on the market which is claimed to accurately measure hydrogen sulfide in steps of 0.5 p.p.m. in con-

from ALCOA

good designs made better with aluminum



Aluminum tapered plate saves time, money and weight in large tank construction

New Alcoa® Aluminum tapered plate demonstrates remarkable cost savings for fabricators of large field-erected storage tanks. Tank design, of course, requires different wall thicknesses, varying in proportion to height, diameter and specific gravity of the contents. Because aluminum tapered plates are disposed vertically rather than the conventional horizontal arrangement (see sketch), savings are readily evident—up to 18 per cent in sidewall metal and over 40 per cent in welding labor costs. Now available from Alcoa in a wide range of alloys. We urge that you discuss tapered aluminum plate with your fabricator, and the local Alcoa sales office. For more information, please send the coupon.

ALCOA ALUMINUM
ALUMINUM COMPANY OF AMERICA

Aluminum Company of America, 826-Y Alcoa Building, Pittsburgh 19, Pa.

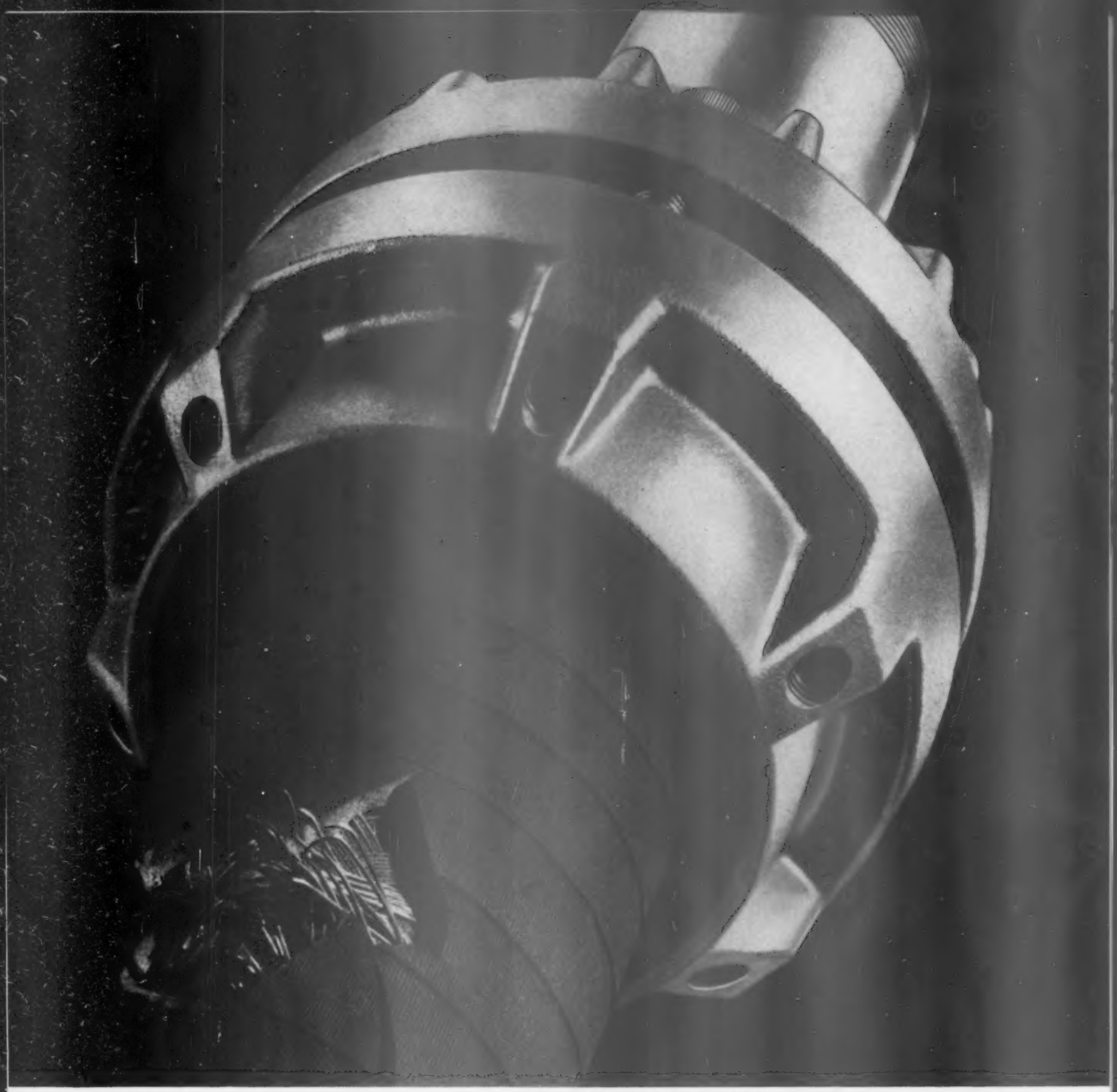
Please send more information about Alcoa Aluminum tapered plate.

Name _____ Title _____

Company _____

Address _____

City _____ Zone _____ State _____



FOR ROTARY DRILLING HOSE

Now a reusable coupling that won't blow-off

An important first in rotary hose coupling design. Power-Grip is the first coupling that's actually stronger than the hose itself — won't blow-off, even up to 12,000 psi. ■ And when the hose bursts, you can quickly repair the break yourself right at the drill site with Power-Grip. You need only an Allen wrench to put it on or take it off the hose. ■ And with Power-Grip you can couple short lengths to make vibrator hose . . . thus doubling the life of your hose. ■ Built to take rough use and abuse, Power-Grip won't snag cables. Learn how it can save you down-time and replacement hose costs. See your local Power-Grip distributor, or write to address below for more information.

POWER GRIP COUPLINGS

CONSOLIDATED CONTROLS CORPORATION
ANNAPOLIS, MARYLAND

A Member of The Condec Group

centrations from 0.5 p.p.m. and more. The maker says the presence of hydrogen sulfide can be determined in 1 minute.

Weighing 5 oz., the kit is packed in a pocket-size plastic box that measures 4⅜ by 2⅝ by 1 in. With the reagents contained in the kit, 50 tests can be performed on water averaging 3 p.p.m. hydrogen sulfide. Source: **Hagan Chemicals & Controls, Inc.,** Hagan Center, Pittsburgh 30, Pa.

•

New mud-pump design

To make a homogeneous steel unit for the Model H-1250 mud pump now on the market, the designer has welded forged-steel valve pots to forged-steel fluid-cylinder bodies and joined them with a cast-steel discharge manifold by automatic submerged-arc welding. To assure that the welds are stronger than the parent metal, the welds are stress-relieved after welding and all weld metal inspected by X-ray. In addition, all of the 1,250-hp. pumps are hydrostatically tested at 8,000. Source: **National Supply Div., Armco Steel Corp.,** 2 Gateway Center, Pittsburgh 22, Pa.

•

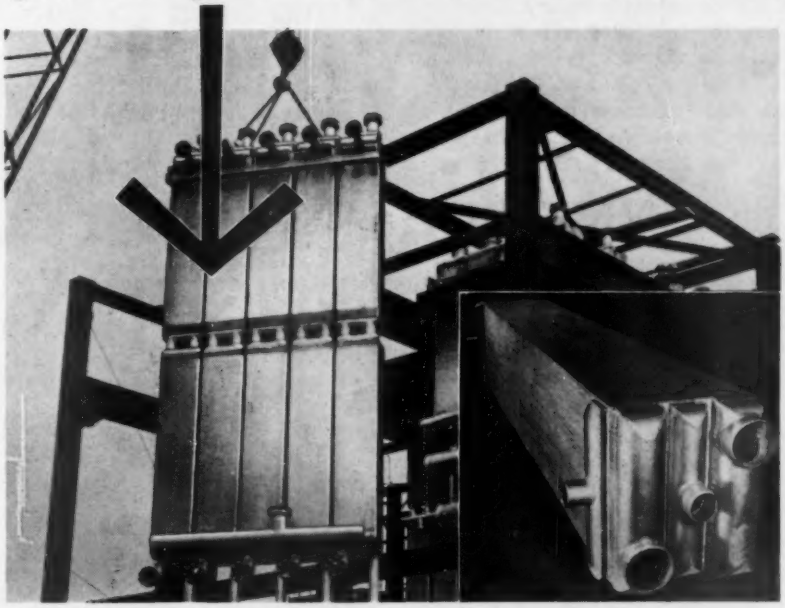
Pipeline-data telemetering system

Information from various types of meters on pipelines can be remotely displayed and recorded with this new digital-data-transmission system. In one central location, flow data from a number of points along a gas or oil line can be recorded. Data may be transmitted over commercial telephone lines or over private channels.

The system is said to be self-synchronizing and self-checking. Data is transmitted as a six-character decimal digit message. Called the Datex SD-102 Accumulated Count Data Transmission System, it is designed so readout may be obtained on demand or programed automatically. Source: **Datex Corp.,** 1307 S. Myrtle Ave., Monrovia, Calif.

from ALCOA

good designs made better with aluminum



Rohm & Haas reports close-temperature approaches, efficient oxygen production with Trane Brazed Aluminum Heat Exchangers

Trane Brazed Aluminum Heat Exchangers, made with Alcoa® Aluminum, are used in the production of tonnage oxygen at the Rohm & Haas plant, Pasadena, Texas. (Inset shows assembly unit.) After three years of operation, Rohm & Haas reports temperature approaches as close as 2°F, operating temperatures as low as –291°F. Close temperature approaches give very high thermal efficiency, high recovery of refrigeration and consequent economical operation. Ideal for cryogenic equipment, Alcoa Aluminum alloys maintain ductility and resistance to shock loading at extremely low temperatures. In fact, tensile and yield strengths actually improve in the cryogenic ranges without embrittlement. Please send the coupon for more information.

ALCOA ALUMINUM
ALUMINUM COMPANY OF AMERICA

Aluminum Company of America, 826-YY Alcoa Building, Pittsburgh 19, Pa.

Please send me the following literature:

☐ 68-10460 *Process Industries Applications of Alcoa Aluminum*
☐ 88-11251 *Cryogenic Applications of Alcoa Aluminum*
☐ 34-11566 *Alcoa Aluminum Heat Exchanger Tubes*

Name_____ Title_____

Company_____

Address_____

City_____ Zone_____ State_____

Slide rule aids rotameter sizing

Rotameters can be sized quickly with a new circular slide rule which provides one-setting solution of the basic temperature-pressure and specific-gravity equations involved in rotameter sizing. It sells for $1.

Applicable to any rotameter type of instrument made by any manufacturer, the calculator consists of two circular slide rules, one for solving liquid-service equations and one for gas and steam-service equations. Source: **Brooks Instrument Co.**, 407 W. Vine, Hatfield 6, Pa.

Clamp lines up 8-in. pipe

AN 80-lb., 38-in.-long pneumatic lineup clamp for 8-in. pipe now available is designed with the air tank on the control rod to achieve a high degree of maneuverability for the clamp. The maker says the clamp is able to negotiate any normal bend and that the roller shoes roll pipe into a round shape.

Pneumatically controlled, the heads operate independently for fast and positive lineup. A 325-cu. in. air-reserve tank stores enough air to permit several lineups before it needs refilling. Source: **Crutcher-Rolfs-Cummings, Inc.**, P. O. Box 2073, Houston, Tex.

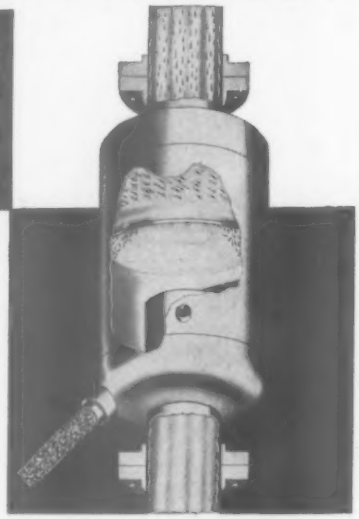
•

Plastic-clad pipe and fittings

A solution to pipe corrosion and replacement problems is offered by a new line of pipe and fittings which are clad with a chemically inert thermoplastic, chlorinated polyether, tradenamed Penton. Corrosion protection is provided from low temperature to more than 250° F. The

INCREASE GAS SCRUBBING EFFICIENCY

.... Lower Maintenance with Hi-eF Scrubbers



Hi-eF Gas Scrubbers are guaranteed to remove virtually 100% wet and dry entrainment . . . yet require no maintenance. Unique design has no moving parts . . . no messy filters. Highly successful in suction lines at compressor stations, with intercoolers and aftercoolers and in field gathering stations. Send for Bulletin 601 giving complete details.

Hi-eF PURIFIER

By the Manufacturers of Super-Silvertop Steam Traps

THE V. D. ANDERSON COMPANY

Division of International Basic Economy Corporation

1977 West 96th Street Cleveland 2, Ohio

W. C. NORRIS

Target SAVINGS THRU QUALITY

WRITE FOR NEW FITTINGS BULLETIN P. O. BOX 1739, TULSA

FITTINGS

Humble Oil uses Airco Nitrogen in this giant low temperature sphere to help store 4,000,000 lbs. of ethylene in liquid form.

Airco Nitrogen helps dry up storage costs for Humble

In the face of today's high costs, how do you save on storage facilities for a gaseous product—in this case, ethylene?

Here is what Humble Oil did. They built a double wall steel sphere nearly 5 stories tall and filled the space between shells with perlite. Then through the billions of interstices in the perlite they circulated pure, dry nitrogen from an Airco cylinder station.

Next they pumped in the ethylene in liquid form at a crackling 140°F below zero... and achieved storage economy not possible in any other way. The secret's in the *liquid form*, for liquid ethylene needs only a fraction of the space needed by gaseous ethylene. And to maintain the ethylene as a liquid, the insulation must be kept absolutely dry. This is why Humble Oil and Refining Company uses Airco's nitrogen to cut down its storage costs for this widely used petrochemical at Linden, N. J.

Nitrogen at Bayway Refinery is also used to blanket lube oil additives, to purge filters of explosive hydrocarbons and to handle powdered catalysts. Airco nitrogen answers all these needs.

In nearly every industry modern Airco processes based on gases are reducing costs, boosting production and raising quality. Airco gases can give you cold... heat... special atmospheres... or can act as raw materials for chemical reactions.

AIRCO®

AIR REDUCTION SALES COMPANY

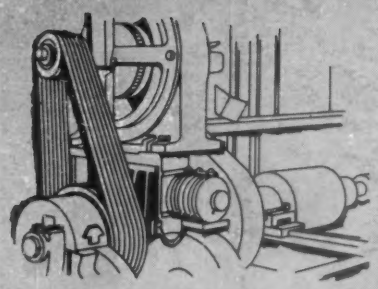
A division of Air Reduction Company, Incorporated

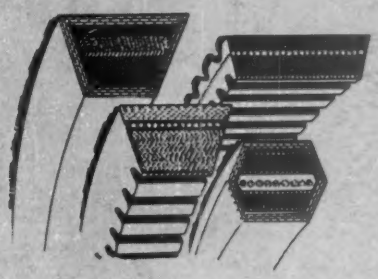
150 East 42nd Street, New York 17, N. Y.

More than 700 Authorized Airco Distributors Coast to Coast

On the west coast—
Air Reduction Pacific Company
Internationally—
Airco Company International
In Canada—
Air Reduction Canada Limited
All divisions or subsidiaries of Air Reduction Company, Inc.

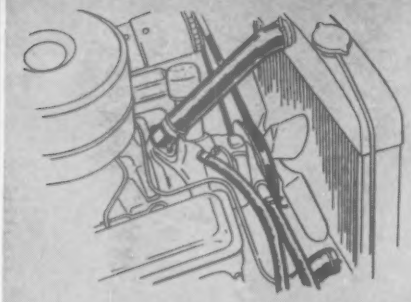
V-BELT DRIVES

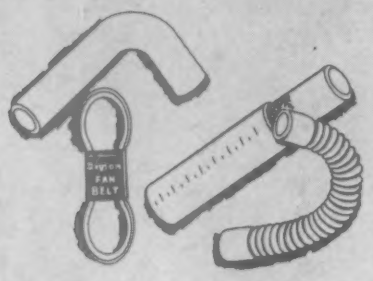




Dayco offers the only complete line of V-Belts in the industry for every power transmission need—from fractional to 1,000 and more horsepower.

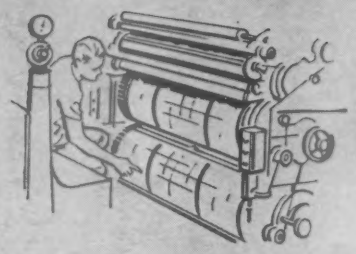
AUTOMOTIVE PRODUCTS

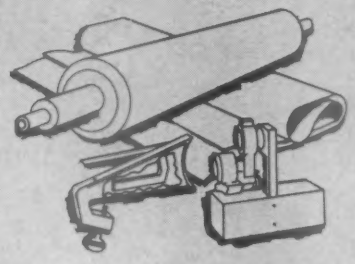




Dayco provides a complete line of Fan Belts, Radiator Hose, and other rubber products for passenger cars, trucks, busses, and tractors.

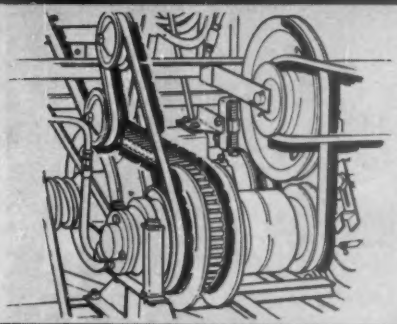
PRINTING PRODUCTS

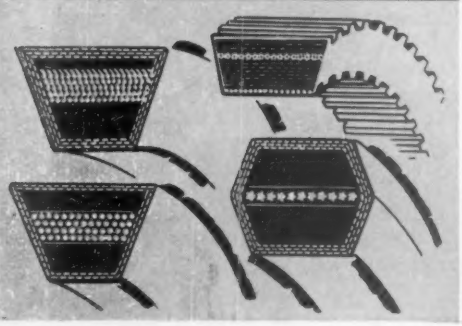




Dayco offset and letter press rollers, Gold Seal offset Blankets, Color Separators and Fountain Dividers, for all makes of presses.

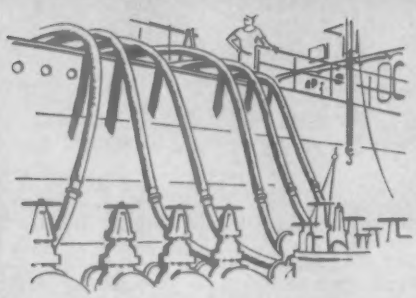
AGRICULTURAL V-BELTS

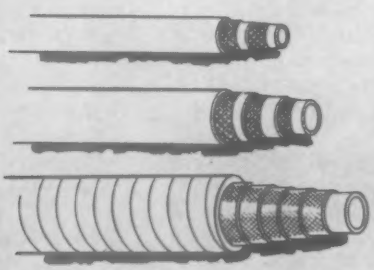




Dayco builds specialized V-Belts for the efficient transmission of power on all types of traction, propulsion and auxiliary farm implement drives.

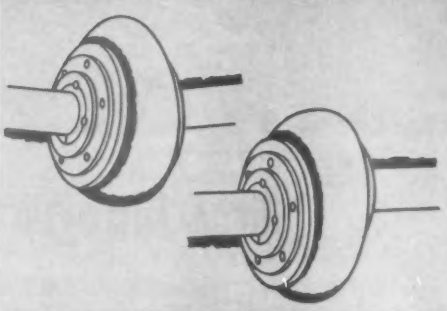
INDUSTRIAL HOSE

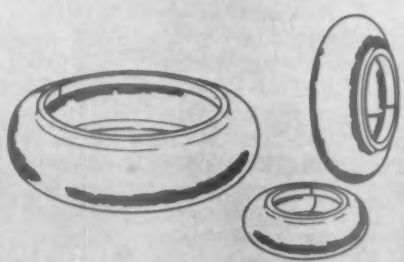




Dayco offers molded and horizontal braided, machine and hand wrapped fabric, and woven jacket constructions for all industrial applications.

MOLDED RUBBER





Dayco custom-engineered molded rubber, rubber-to-metal and rubber-and-fabric components for mechanical applications.

Dayton

Take your pencil. Get all the Dayton literature from your files. Make one little change. In place of Dayton write Dayco.

From now on, that's our product name. **Dayco** V-Belts. **Dayco** Hose. **Dayco** Printing Rollers and Blankets. **Dayco** Molded Rubber. **Dayco** Agricultural and Railway Drives.

Thus ends the difference between our corporate name, Dayco and our **former** product name, Dayton.

Let us repeat. The only thing that's changed is the name. The same high quality. The same broad line. The same friendly, helpful people. Only their product line is now **Dayco. DAYCO. D-A-Y-C-O.**

Dayco CORPORATION

Rubber Products Division — Melrose Park, Illinois

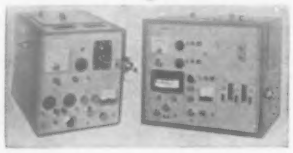
(Formerly known as The Dayton Rubber Company)

maker says the claddings have outstanding mechanical stability and wear resistance.

Compared to separately lined pipe, the clad pipe is more easily assembled and eliminates liner-adherence problems, the maker says. Since the exterior cladding is applied simultaneously with the interior cladding during the coating operation, the need for separate outside corrosion protection is done away with.

The clad pipe comes in 10-ft. lengths with diameters from 1½ to 24 in. and with a Schedule-40 wall thickness. It is clad both inside and outside with a protective film measuring 0.025 to 0.035 in. thick. Elbows, tees, crosses, reducers, and laterals are available in all sizes. Source: **Polymer Corp.,** 2120 Fairmont Ave., Reading, Pa.

●



Two new chromatographs

These two new chromatographs offer a number of useful features, the maker reports, including a wide temperature range, choice of thermal conductivity and ionization-type detectors, independent injection-port temperature control, reproducible sampling for gases and liquids, and electronic detector-oven temperature control.

The Model 15B chromatograph features such items as direct-coupled or vibrating-reed electrometers for the ionization detectors, column switching, and an optional isolated detector oven.

The Model 70 instrument features dual-column programing with column-vapor-pressure compensation, easy column access, and a radioactivity detector for simultaneous tagged-component chromatograms. Source: **Loe Engineering Co.,** 2092 N. Lincoln Ave., Altadena, Calif.

●

Liquid-level controller

This new level controller for maintaining the correct liquid level can be applied to almost any type or size vessel to obtain continuous level indication or control. Using the Geiger-Mueller principle of radiation detection, the controller has sensing heads housed in thick steel tubes to meet explosionproofing requirements. Each head is 6 in. long and can be increased by 6-in. increments to meet specific applications.

The instrument has no moving parts and can be installed so there is no contact with the material being gaged. Thus high or low-viscosity materials can be controlled without clogging the material or the instrument. Recording and other instruments can be located up to 500 ft. away from the instrument. Source: **Ohmart Corp.,** 4241 Allendorf Dr., Cincinnati 9, Ohio.

"Triple Threat"
TO SUCKER ROD FATIGUE
1. JONES SUCKER RODS
2. JONES UNDERCUT PINS
3. JONES ROLLED THREADS
1
Rolled threads are stronger at the point where most pin failures originate . . . steel fibers and grain are rearranged to follow the thread contour, providing a dense structure at the critical thread root. Sucker rods with rolled threads make up tighter and stay tight because there are no high spots to beat down and cause the joint to loosen.
Undercutting the pin shank further increases fatigue resistance by eliminating the run-out thread and improving the elasticity of the joint.
Ask your Jones representative for further information on the "Triple Threat".
THE S. M. JONES COMPANY
Division of Buffalo Eclipse Corporation
General Office and Factory: TOLEDO, OHIO
Sales Office: Enterprise Building, TULSA, OKLAHOMA
Export Department: The S. M. Jones Company
2
3
JONES
SUCKER RODS

OIL KING!

Acknowledged so

by oil men who have used all kinds of gauges

The ten-gallon hat on the Marsh Mastergauge is worn as a crown of acceptance, an emblem of excellence... well earned through years of rugged oil country service.

Just as kings ascend thrones through lineage, the Mastergauge was destined for "royal" acclaim the day it hit the drafting board. Because every product born at Marsh is "born to the purple."

For what other gauge has the Marsh heritage of functional design innovations? Only Marsh offers Conoweld construction, the Marshalloy case, "coined" sector Mastergauge movement, "Recalibrator" adjustment, and optional Safecase protection plus.

That's why we say the *next* great thing that happens in gauges will happen at Marsh.

MARSH INSTRUMENT COMPANY, Dept. L, Skokie, Ill.

Division of Colorado Oil and Gas Corporation

Marsh Instrument & Valve Co. (Canada) Ltd., 8407 103rd St., Edmonton, Alberta, Canada.
Houston Branch Plant, 1121 Rothwell St., Sect. 15, Houston, Texas.
Eastern Seaboard Warehouse: Marsh Instrument Company, 1210 Anderson Ave., Fort Lee, N.J.

MARSH GAUGES

In stock at your nearest Supply House

"THE STANDARD OF ACCURACY"

VAREC *Announces*
24 HOUR SERVICE...

RAY V. LONG
President, Varec, Inc.

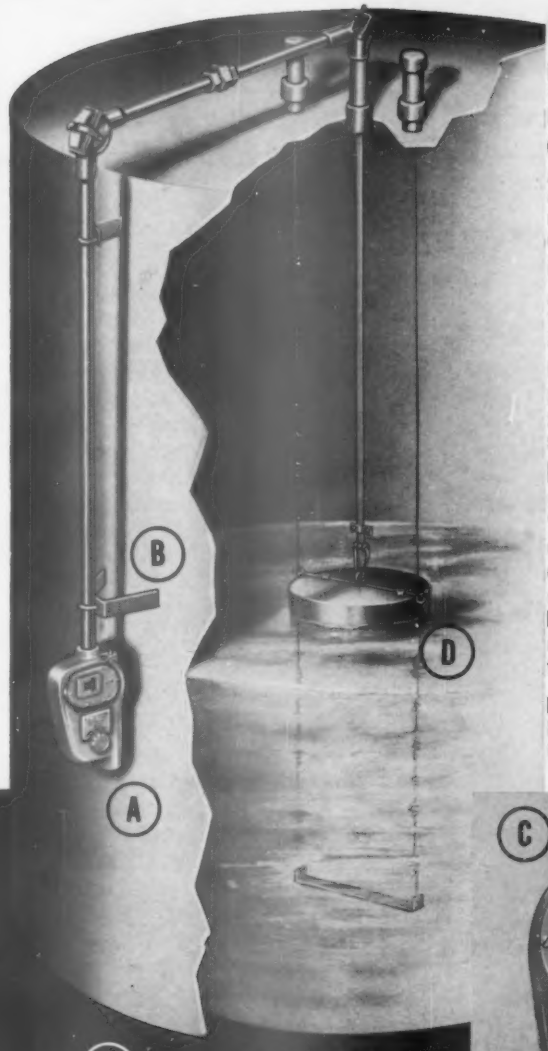
Ray Long, President of VAREC, has personally instituted new procedures which will guarantee shipment of VAREC's new improved 2500-B Series tank gauges to customers within twenty-four hours of receipt of order.*

To accomplish this unprecedented service to VAREC customers, Long has established a Central Stock, which is under the control of sales and independent of production. From Central Stock in Los Angeles, quantities of standard 2500-B Series tank gauges will be allocated to key VAREC warehouses in San Francisco, Houston, Chicago, and New York City.

No longer will tank builders and other purchasers have to plan weeks and months ahead to ensure receipt of equipment at the precise time when it is needed. If you can use *standard* equipment, you can call your order today and have it shipped tomorrow.

**Effective December 1, 1961 on standard 2500-B Series tank gauges.*

NEW 2500-B TANK GAUGE



(A) "AT GRADE" OR "TANK TOP" INSTALLATION

The new advanced VAREC Model 2500-B Series tank gauge mounts either at the bottom of the tank as a conventional ground reader, with piping coming in from the top of the gauge head, or at the top of the tank with piping coming in from the bottom...without requiring modification or even attitude change of the tank gauge.

(B) NEW "A-FRAME" MOUNTING

A new "A-frame" bracket firmly supports the gauge head apart from the tank in conventional "at grade" mounting as a ground reader...eliminates possibility of measurement error due to vertical shift and allows the option of "front reading" or "side reading" positioning.

(C) OIL-FILLED HEAD AND COUNTER ASSEMBLY

Another standard in the "dual option" design permits the independent filling of the gauge head and the counter assembly for those applications where continuous lubrication or protection from corrosive elements is desired.

(D) NEW CIRCULAR STAINLESS STEEL FLOAT AS STANDARD

New circular type foam glass float, completely jacketed with type 316 stainless steel, offers "dual option" for use in all fixed or floating roof tanks...stainless steel jacket resists "pinholing"—foam glass insures against sinking.

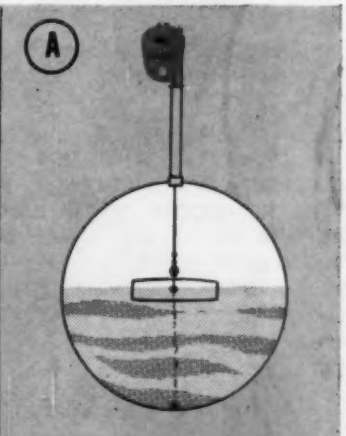
PLUS THESE ADVANTAGES

- New improved Visadial readout...easiest-to-read dial permits accurate "at-glance" readings to 1/16th of an inch.
- New simplified design with fewer parts and improved materials offers greater over-all gauge reliability and longer life...permits assembly by unskilled labor.
- New "harness-hitch" connects float in a jiffy...tape and neg'ator motor may be attached to their drums without use of tools.
- VAREC supplies a package gauge, that is everything supplied complete, except the long horizontal-vertical runs of pipe and union.

For twenty-four hour delivery of the new Model 2500-B tank gauge, contact your local VAREC sales office. For more information, write for Bulletin CP-3301. Dept. OGJ-1700-1.

2500-B TANK FLOAT

2500-B TANK GAUGE



2500-B TOP READING INSTALLATION

2820 NORTH ALAMEDA STREET • COMPTON, CALIFORNIA

Branches and Representatives in Principal Cities

TRADE LITERATURE

Tool for percussion air/gas drilling

This new 6-page brochure describes the Series 350 Hammerdril for fast, straight-hole, percussion air/gas drilling of oil and gas wells. The brochure gives some 20 case histories in which the tool provided either higher penetration rates or straighter holes while using fewer bits than conventional air rotary drilling. Included are specifications for various sizes of the tool, pictures of component parts, and an explanation of the tool's operation principles. Source: **Mission Mfg. Co.,** Box 4209, Houston, Tex.

Data on valve sizing

Entitled "A Practical Look at Valve Sizing," the 4-page literature tells what appears in undersized, oversized, and correctly sized pressure-reducing applications. The literature offers typical examples, points out dangers of mis-sizing, and includes advantages of correct sizing. Source: **Jordan Valve Div., Richards Industries, Inc.,** 6013 Wiehe Rd., Cincinnati 37, Ohio.

X-ray equipment in pipeline building

Technical Bulletin 6—"The Use of Portable X-Ray Equipment in Pipeline Construction" — has just been published. It provides a detailed description of the application of radiography in pipeline construction work, along with data dealing with actual X-ray techniques employed. Source: **Balteau Electric Corp.,** 10-14 Meadow St., Stamford, Conn.

Distillation-column controls

Eight-page Application Bulletin 91-45-01, now available, outlines typical practices for control of distillation columns in chemical-process industries. The publication covers typical instrumentation of the feed, bottoms product, reboiler circuit, and overhead product phases of distillation. It gives pertinent instrument loops and describes instruments by which the loops are formed. Source: **Fischer & Porter Co.,** 6 Jacksonville Rd., Warminster, Pa.

Horizontal coolers and condensers

Sixteen-page catalog 561 gives information on horizontal core, air-cooled heat exchangers for the cooling and temperature control of oil, water, and gases or for condensing vapors. The revised literature describes efficiency, economy, and versatility of the units. Illustrations of typical applications point out their durability. Included are structural features of various cooling sections and available cores. Source: **Young Radiator Co.,** Racine, Wis.

Metallic gaskets

This 28-page brochure is divided into six basic sections, each dealing with a different type of gasket: Spirotallic, metal-jacketed, flat metal, corrugated, round cross-section, and heavy cross-section. Sections in Publication PK-152A are illustrated with gasket photographs and cross-sections, augmented by concise, descriptive text. Paragraphs that head each section include information on

WIDEST POSSIBLE RANGE OF SIZES AND CAPACITIES — UNBEATABLE MCKISSICK CONSTRUCTION —
EXTRA HEADROOM, SHORT OVER-ALL LENGTH. CENTER PLATES BETWEEN EACH SHEAVE.
EXTRA WEIGHT FOR BALANCE . . . JOHNS-MANVILLE "KLIPPER" GREASE SEALS.
EXTRA LARGE BEARING DIAMETER, E-Z OPENING GUARDS. NO BOLTS TO REMOVE. 17" TO 42". O. D. ALLOY STEEL FLAME HARDENED SHEAVES. BUILT IN "BUMPER".
McKISSICK
McKISSICK PRODUCTS CORPORATION
Box 2496 Tulsa, Oklahoma

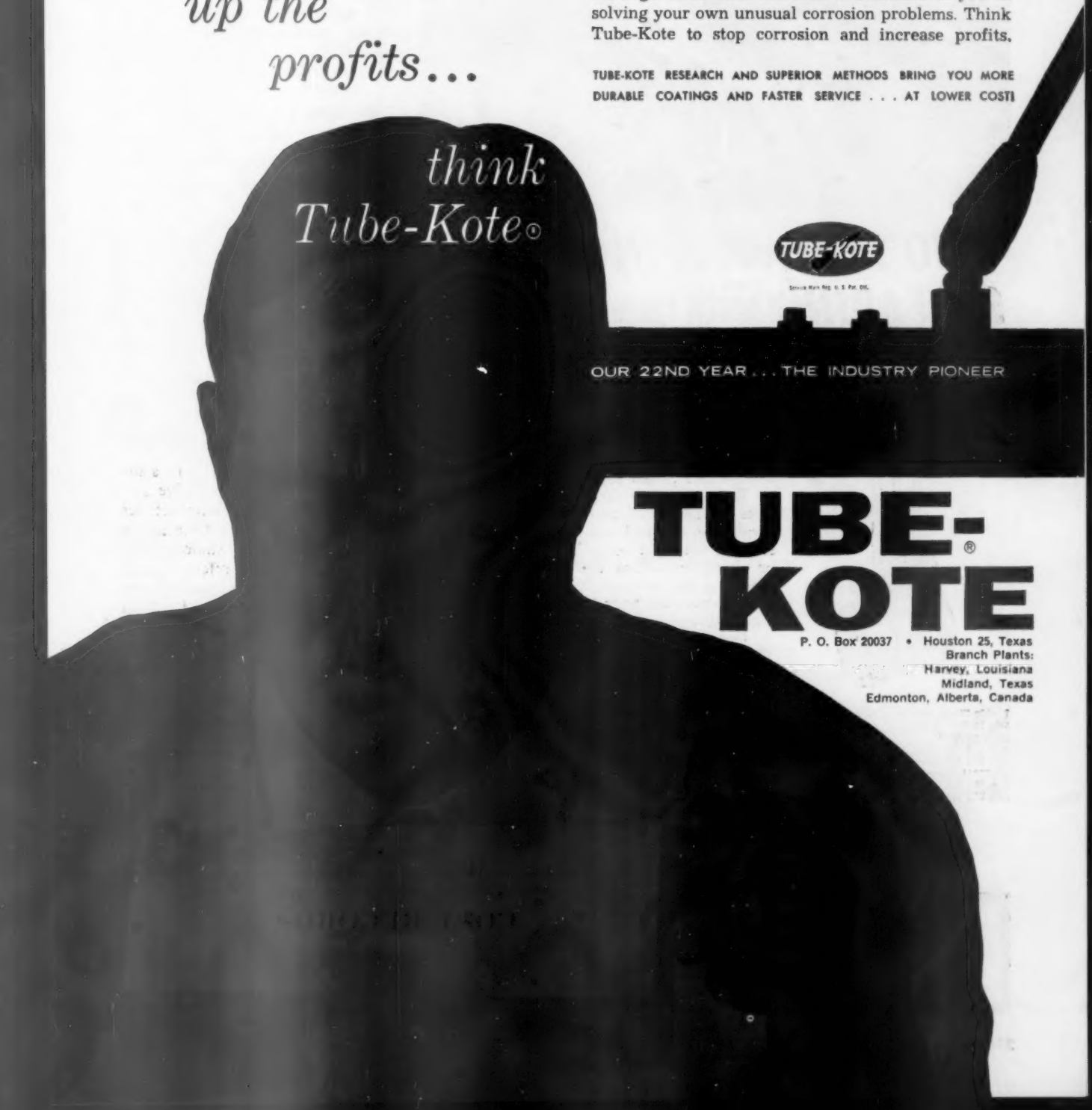
when corrosion is eating up the profits...

The cost of replacing tubing can be almost prohibitive in highly corrosive fields and offshore wells. These replacement costs may be significantly lowered by using Tube-Kote plastic coatings to protect metal from corrosion. Tube-Kote coatings are recommended for protection of storage tanks, flow lines and wherever loss of equipment due to corrosion adds to operating cost. Performance proved the world over for more than 20 years, Tube-Kote coatings are also recommended to prevent paraffin deposition.

Tube-Kote sales engineers will show you case histories of increased profits after using Tube-Kote coatings. Tube-Kote research is available to you in solving your own unusual corrosion problems. Think Tube-Kote to stop corrosion and increase profits.

TUBE-KOTE RESEARCH AND SUPERIOR METHODS BRING YOU MORE DURABLE COATINGS AND FASTER SERVICE . . . AT LOWER COST!

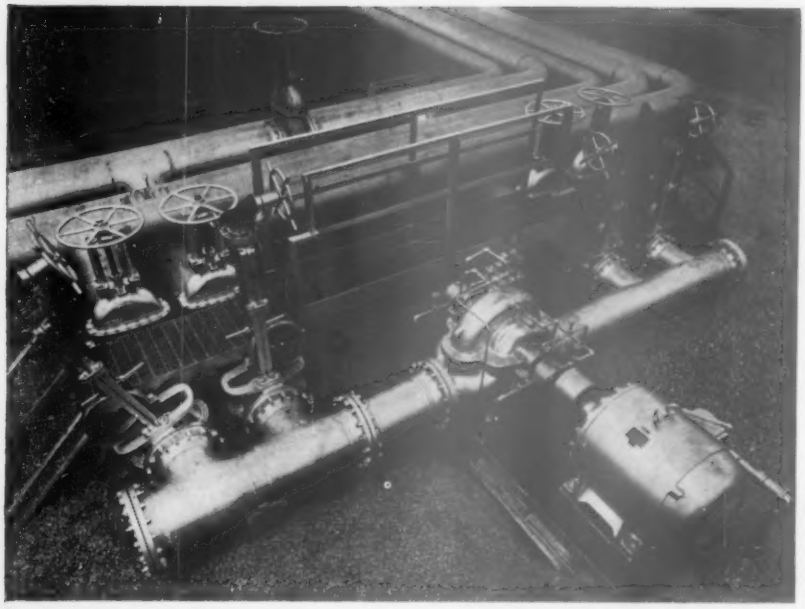
think Tube-Kote®



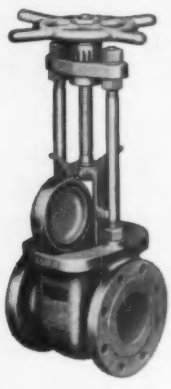
OUR 22ND YEAR . . . THE INDUSTRY PIONEER

TUBE-KOTE®

P. O. Box 20037 • Houston 25, Texas
Branch Plants:
Harvey, Louisiana
Midland, Texas
Edmonton, Alberta, Canada



NO SPILLAGE... NO LINE SPREADING with Hamer VISIBLE WEDGE LINE BLIND VALVE



Visible Wedge Line Blind Valves are available in three types:
STRAIGHTWAY
ASA 150 lbs. Sizes 1½" thru 18"
ASA 300 lbs. Sizes 1½" thru 16"
VERTICAL ELBOW and TEE
ASA 150 lbs. Sizes 3" thru 12"
ASA 300 lbs. Sizes 4" thru 12"

Where line spillage is intolerable or hazardous . . . where there is no space for line spreading, the HAMER Visible Wedge Line Blind Valve is the perfect installation.

Wedge type spectacle plates, pivoted on a yoke assembly and raised and lowered by a handwheel, seat and seal against stainless steel seats in the rigid body. The valve is opened or closed by raising the yoke assembly and switching the wedges. One wedge is always visible above the body to indicate from a distance whether valve is opened or closed.

Opening or blinding a line with the Visible Wedge Line Blind Valve is a one man operation requiring just a few minutes. Cost records from scores of users show you save 90% and more every time a line is blinded. Compare that with the cost of outmoded methods of line blinding and you can see why it pays to use Hamer Line Blind Valves.

Write for Hamer Catalog 60 for complete description of all types, sizes and pressure ratings.

WECO
WELL EQUIPMENT MFG. CORP.
P. O. BOX 19465 • HOUSTON 24, TEXAS
HV-7-61
fmc CORPORATION
Division of CHIKSAN COMPANY
a subsidiary of FMC CORPORATION

WECO UNIONS | CHIKSAN SWIVEL JOINTS | HAMER LINE BLIND VALVES | HAMER PLUG VALVES | WECO AIR-O-UNION | WECO COMPOUNDS | WECO SNATCH BLOCKS

"where recommended," "how they work," "why suggested," and "what constructions are available." Source: **Packing & Friction Materials Div., Johns-Manville,** 22 E. 40th St., New York 16, N. Y.

Furnace explosions

This literature piece (Bulletin E-101, 16 pages) analyzes the causes of 156 actual furnace explosions, discusses the theory of explosions during flameouts, and presents practical recommendations for safe operating procedures. Source: **Babcock & Wilcox Co.,** 161 E. 42nd St., New York 17, N. Y.

Tankage piping with ball joints

Four-page Bulletin 33 discusses requirements for piping connections to large outdoor tanks. Drawings show an existing installation in a refinery tank farm employing conventional pipe loops for flexibility, and the same oil tank showing greater flexibility achieved with less plot by using ball joints. Data is included on engineering, safety, and economic advantages of using ball joints. Source: **Barco Mfg. Co.,** Barrington, Ill.

Gas-flow-recording system

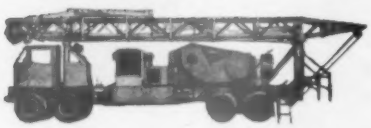
Bulletin SD-103 features the Datex SD-103, an inexpensive system of monitoring interruptibles and recording gas flow from multiple remote customer stations. The two-page publication offers features of the instrument, along with input and output specifications for both remote and central stations. Source: **Datex Corp.,** 1307 S. Myrtle Ave., Monrovia, Calif.

Solid-state telemetering system

Illustrated in this new catalog is the Telemetrol system, which can connect up to 32 satellite stations to a central facility via two-wire party line, or, with additional party lines can connect as many satellite stations as desired. The system is said to provide accurate, on-line data collection and supervisory control for widespread telemetering and telecontrol operations. Source: **Control Systems Div., Daystrom, Inc.,** 4455 Miramar Rd., La Jolla, Calif.

If you're caught in the cost squeeze

Get the facts about WINCHMOBILE JR.



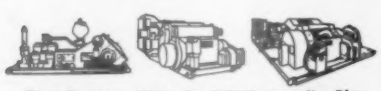
Wilson

Before you buy get the facts on light weight... low cost... long life Winchmobile Junior with the cross mounted engine which saves moving parts and increases hp to the drum by 15%!

WILSON MFG. CO., INC.

Wichita Falls, Texas • The Home of RED IRON

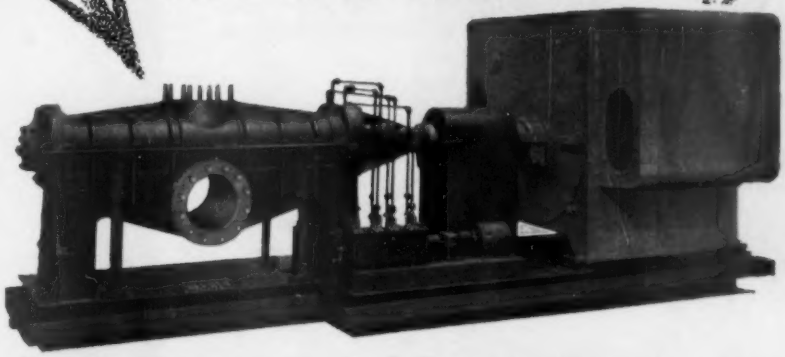
Winchmobiles Traveling Blocks Speedwinches



Slush Pumps 3000' to 25000' capacity Rigs

WARREN'S

MAJOR CONTRIBUTION to more efficient and reliable PIPE LINE SERVICE



the WARREN HIGH PRESSURE SCREW PUMP

This Warren #8CB Screw Pump is one of three recently shipped for an important pipe line job. It is designed for 560 GPM of 1400 SSU viscosity refinery bottoms at 800/1000 PSIG discharge pressure. The drive is a 400 HP, 870 RPM direct connected electric motor. Pump body is ductile iron. Notice the separate force feed lubricator for bearings and mechanical seal.

EFFICIENT—On either high or relatively low viscosities, this Warren High Pressure Screw Pump offers exceptional operating economies—with efficiencies of 75% to 85%.

RELIABLE—It delivers constant, pulseless flow which assures minimum pipe line stresses. And capacity change due to viscosity variation is negligible.

Bearings can be lubricated either externally or by the product being pumped—with or without filtering. For even longer wear without servicing, body bores and screws can be hard surfaced.

Its increasing use at many unattended stations is adding to its reputation for reliability.

WRITE *for* COPY *of* BULLETIN AND SELECTION NOMOGRAPH 252

CENTRIFUGAL SCREW RECIPROCATING GEAR

WARREN

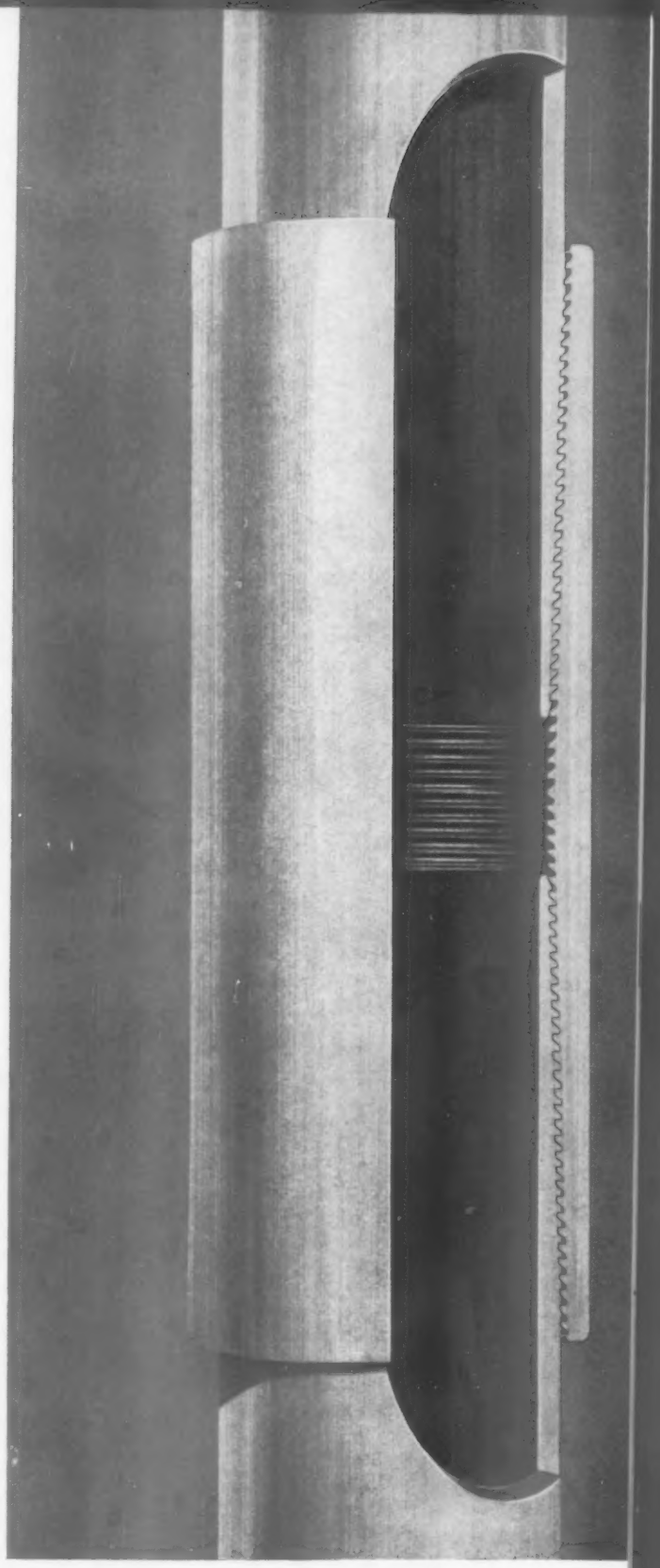
WARREN PUMPS, INC. WARREN, MASSACHUSETTS

The "OILWELL" string

PRODUCTS
SERVICES
STORES

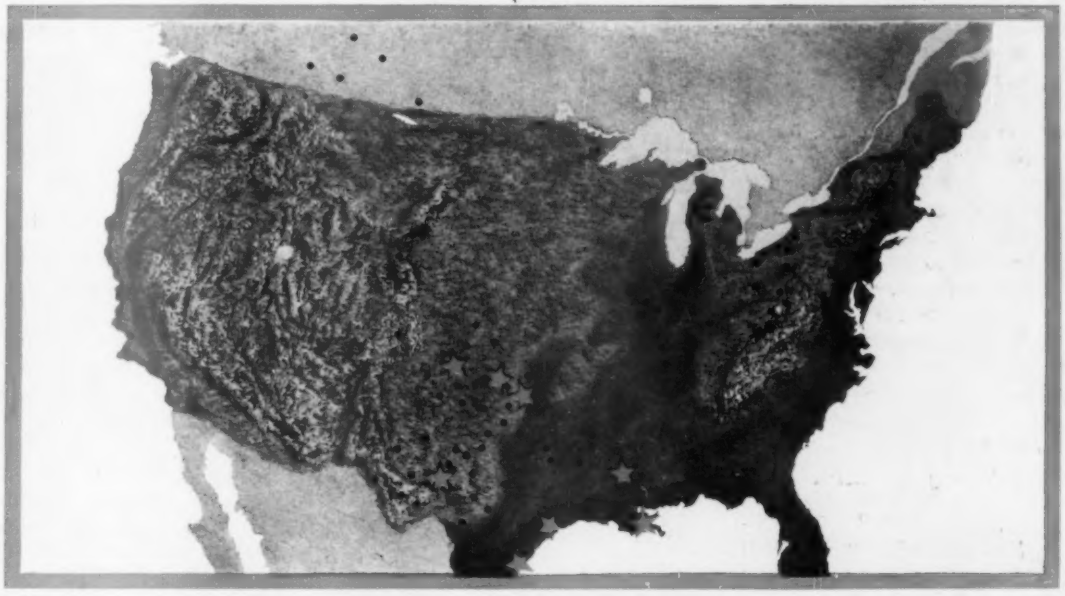
Here's why USS National Buttress-Thread Tubing cuts completion costs

Newest word in the oil fields is the USS National Buttress-Thread joint. Especially where there's a trend to multiple completion wells and slim hole wells. Reason: the unique new thread eliminates the need for the internal upset in casing as well as the external upset in tubing. The result is maximum hole clearance, and you can run multiple tubing strings with minimum interference. Joint strength is comparable to the strength of the body of the pipe itself. Stabbing is simple and fast without thread damage or cross threading. The pipe slips easily into the coupling, engages immediately, and 2½ turns make it gas-tight. Heavy tin plating on the coupling threads eliminates gas leaks even at pressures as high as 15,000 psi. Best of all, unlike upset pipe, if Buttress-Thread ends are damaged you can repair them by cutting new threads right in the field. You get more use out of USS National Buttress-Thread Tubing in every way. Buy it through "Oilwell".



A tough test

The USS National Buttress-Thread joint was tortured worse before its introduction than it ever will be in normal service. For example, National Tube engineers rammed casing nipples into couplings until they tore the threads loose. Despite these brutal measures, the couplings didn't fail—the joint remained intact. Other mill tests showed that Buttress-Thread joints can be made up and broken at least 12 times without thread damage or impairment to joint performance. No matter what you buy from "Oilwell", you can be sure it's been tested seven ways to Sunday.



How to buy USS National Buttress-Thread Tubing

Order it through any "Oilwell" store or sales office. Stocks are maintained for fast delivery in Odessa, Corpus Christi, Houston, Harvey, Vidalia, Oklahoma City, Hennessey and Gray. The dots on the map show "Oilwell" stores, the stars indicate Buttress-Thread Tubing warehouse locations. Call us for immediate shipment. Or call us even if you just want to talk about USS National Buttress-Thread Tubing. We *like* to talk up its many cost-saving advantages.

USS, "Oilwell" and National are registered trademarks

USS Oil Well Supply
Division of
United States Steel

Executive and Export Offices: Dallas, Texas

EQUIPMENT MEN

Smith Tool Co. appoints two to vice president positions

Appointment of F. E. (Ed) Siever as vice president of domestic sales (including Canada and Alaska) and H. G. (Hal) Bentson as vice president of export and industrial sales

F. E. Siever

H. G. Bentson

of Smith Tool Co., a division of Smith Industries International, Inc., has been announced by Kenneth H. Swart, Smith Tool president. Siever will continue to make his headquarters in Odessa, Tex., and Bentson at the company's head office in Compton, Calif.

Siever assumes his new post following the resignation of Arthur S. Marshall. Joining the company in 1955 as a regional sales manager, Siever was elevated to the position of Mid-Continent sales manager in 1958. Bentson joined the company in 1955 as chief engineer—sales, the post he held until his present promotion. Prior to joining Smith Tool, he was with Security Engineering for 17 years.

Technical Tool Corp. names J. Harry Young as district mgr.

J. H. Young

John P. Davis, general sales manager of Technical Oil Tool, announces the promotion of J. Harry Young to district manager for the Totco sales and service organization in western Canada. Young has been with Totco since 1957.

At the same time, the company made two other appointments. Richard Z. Corkery, named sales and service representative working out of Calgary, will operate under Young's direction. And, Donald D. Williams has joined the company to work as a sales and service representative in Oklahoma City. Williams will operate under the supervision of R. W. Ard, division manager.

E. B. Germany elected chairman of Lone Star Steel Co.'s board

Germany succeeds R. L. Thornton, Sr., who accepted the chair last April on the condition that he be relieved toward the end of 1961. Germany's election is the second such action to be taken by the board. Earlier he was elected for an interim period following the death of Fred F. Florence.

He retired as chairman when Thornton agreed to serve as chairman for a stipulated period of time. Thornton, former mayor of Dallas, will continue on the Lone Star board. Both Germany and Thornton are charter board members. Germany has served as company president the past 12 years.

Hutchison Mfg. Co. makes three sales-management assignments

L. J. Hayes

J. E. Smith, president of Hutchison, a subsidiary of Revere Electric Mfg. Co., announces the following appointments: L. James Hayes, general manager; Johnny R. McPeak, manager of oil-field sales; and W. C. Philipp, manager of vibrating screen sales.

Hayes was formerly a sales engineer with Wholesale Electric Supply Co. Before joining Hutchison, McPeak was with Jarecki International and later with Ideco as manager of the full-view mast department. Philipp worked for Westinghouse Electric and Cardwell Mfg.

J. R. McPeak

W. C. Philipp

Joe V. Kidd named to new post by F. H. Maloney Co.

J. V. Kidd

Joe V. Kidd has been appointed assistant general sales manager and director of technical services for F. H. Maloney Co., it was announced by President E. E. Eutsler. Eutsler also reported that Monte D. Leath has been named comptroller and that J. L. Griffith has joined the technical services department. Kidd joined the Maloney firm in 1958 as a sales engineer. He was previously employed by Champlin Oil & Refining Co. at Enid, Okla.

Leath goes to Maloney from Texas Eastern Transmission Co., where he was an economic analyst. Griffith formerly was with Wyatt Industries.

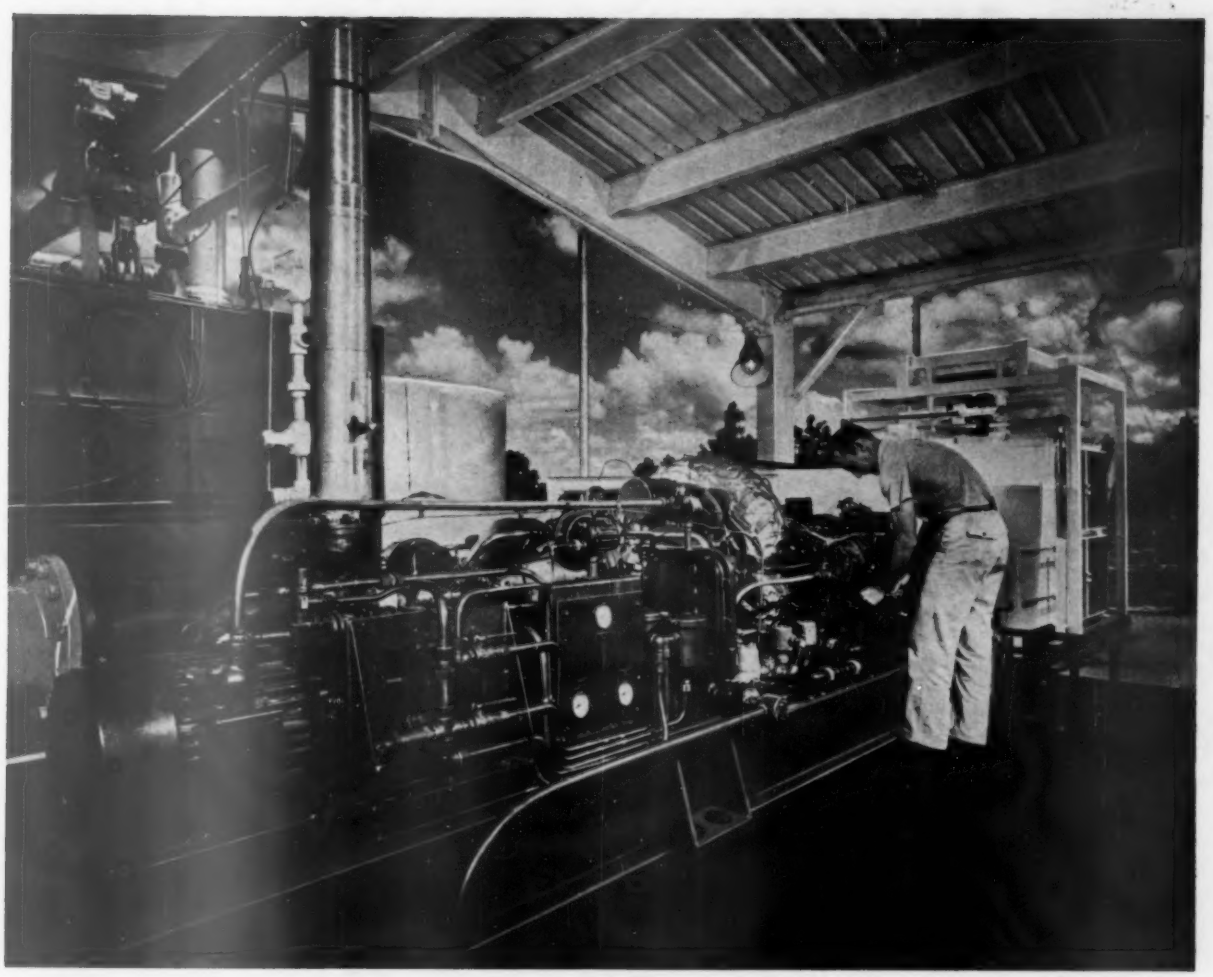
Texas Instruments to furnish oceanographic crew for study

Texas Instruments, Inc. has been awarded a contract by the National Science Foundation to provide an oceanographic measurements team for duty aboard a research vessel participating in the U. S. Antarctic Research Program. The Texas Instruments team, headed by B. J. Mullins, project manager, will operate and maintain the ship's deep-sea winch and bottom-coring apparatus to take samples of the ocean bottom at great depths.

It will also operate equipment to record scientific data by means of thermometers, Nansen bottles to sample water at various depths, underwater cameras, and nets, trawls, and dredges to gather biological and geological samples from the ocean and ocean floor.

Engineering Enterprises issued patent on spiral drill pipe, collars

A basic patent, No. 2999552, covering the manufacture and use of spiral drill pipe and drill collars, has been issued to Engineering En-



TURBOMACHINERY EXPERT

Gas turbine users get specialized installation, maintenance from Solar's experienced field service engineers

Solar field service engineers serve Solar gas turbine customers anywhere, anytime. These trained experts know gas turbines. Many have worked with Solar turbine installations for 10 years. They know how to tailor turbines to specific jobs; they know turbine maintenance.

More and more of Solar's versatile, high performance engines are being used in industry where their light weight, high horsepower and small size mean more efficiency. As a new kind of powerplant, however, gas turbines represent changes in existing methods of installation and maintenance. So Solar sells more than gas turbine engines—it sells experienced customer service too.

Solar's customer service department acts fast to help turbine customers. Immediately following receipt of an order, the department makes complete plans for assisting in the installation and operation of the engine.

The customer service department's team of field service engineers is equipped with current passports and security clearances. Their experience and ability equips them to handle field work and to train customer personnel.

Because of Solar's customer service program, companies without gas turbine experience can take advantage of this engine's superior performance. Solar's customer service department offers on-the-spot help and off-the-shelf spare parts for fast, efficient service.

For information about Solar gas turbines or field service program, write Dept. J-166, Solar, San Diego 12, California.

SOLAR

A subsidiary of International Harvester Company

4 REASONS WHY MILK EMULSIONS REDUCE DRILLING COSTS IN HARD ROCK

Milk emulsions have saved thousands of dollars for contractors and operators drilling in the hard rock areas. Well records reflect a consistently lower cost per foot drilled where emulsions are used.

1. Lower Mud Bill

With milk emulsion drilling fluids mud bills are generally equal to or lower than a comparable type mud system. Less material is required and drayage is reduced. Milk emulsions are less susceptible to contamination — require fewer chemicals. Speed and ease of mud-up (one circulation), maintenance and fewer days on the well save money. Result — reduced drilling costs.

2. Faster Penetration

Milk emulsions oil plate cuttings preventing hydration and solids build-up. These result in fewer days on the hole and lower over-all costs. Low viscosity, plastic viscosity and yield point reduce friction loss and make a higher percentage of the horsepower available at the bit. Better lubrication permits more weight on the bit. Result — reduced drilling costs.

What are Milk Emulsions?

Milk emulsions are low-solids drilling fluids—water containing 5% oil and an emulsifier such as Trimulso, Drilling Milk or Atlosol.

3. Increased Bit Life

Longer bit life means fewer trips to change bits. Since each trip takes significant time, this sharply reduces over-all costs — both from the cost of the bits and the reduction in round trips. Oil wetting action of the emulsifier lubricates bit bearings and keeps bits clean—prevents balling. Result—reduced drilling costs.

4. Less Trouble

Lower hydrostatic head and lower circulating density reduce lost circulation problems —maintain truer gage hole. Thinner filter cake doesn't restrict circulation—lets hydraulics operate as set up. Oil wetting of everything in the hole avoids differential sticking. Result—reduced drilling costs.

In addition to lower costs, other benefits of using emulsions made with Atlas emulsifier include better geological samples, better hole condition and faster penetration.

Atlas emulsifier is sold through distributors under the following tradenames . . . each is the product of Aquaness Department, Atlas Chemical Industries, Inc:

TRIMULSO® distributed by Baroid Division, National Lead Company.

Registered trademark Baroid Division, National Lead Company.

DRILLING MILK® distributed by Magnet Cove Barium Corporation.

Registered trademark Magnet Cove Barium Corporation.

ATLOSOL® distributed by Milwhite Mud Sales Company and other selected mud companies.

Registered trademark Atlas Chemical Industries, Inc.

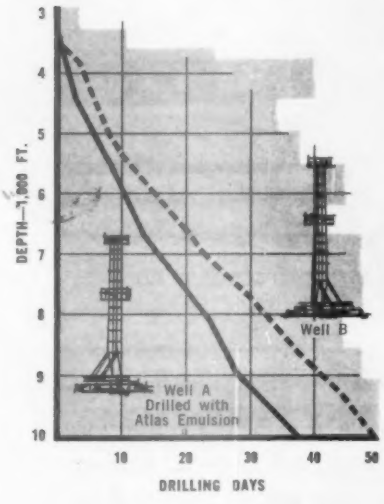
Aquaness
DEPARTMENT
ATLAS CHEMICAL INDUSTRIES, INC.

Atlas Emulsifier Saves $16,823 On Loco Hills Well

Drilling Record Comparison

	WELL A	WELL B
Mud	Atlosol Emulsion	Low Solids CMC
Interval	3,484'-10,000'	3,500'-10,000'
Hole Size	8¾"	8¾"
Drilling Days	37	50
Feet per Day	176	130
Bits Used	53	67
Feet per Bit	123	97

A direct comparison of two wells in the Loco Hills area of New Mexico shows savings typical of those realized when drilling with milk emulsion. Both wells were drilled with rigs of comparable horsepower and hydraulic capacity. Hole size and formation drilled were identical. Well A utilized a milk emulsion made with ATLOSOL, an Atlas emulsifier. Well B used a low-solids CMC mud throughout the comparison interval (3,500 to 10,000 feet).



Well A showed a net saving of $16,823. This saving was made as the result of faster penetration and extended bit life. Thirteen fewer days on the well and fourteen fewer bits reduced the cost per foot by $2.59.

Ask the Aquaness drilling specialist for complete information on all the benefits of Atlas milk emulsion drilling. His case histories show how Atlas milk emulsions have contributed to better wells, drilled faster with substantial savings in over-all costs.

terprises, Inc., by the United States Patent Office in Washington. The announcement was made by Fred K. Fox, president of Engineering Enterprises, who developed the use of spiral, grooved drill collars several years ago. In this time the development has proven to be a major factor in the reduction of stuck drill pipe in high-pressure, deep-drilling operations.

Marshall named marketing v.p. of Security Engineering Division

A. S. Marshall

Arthur S. Marshall has been appointed vice president — marketing of Security Engineering Division of Dresser Industries, Inc. The announcement was made by John C. Helies, president of the Dallas rock-bit and oil-tool manufacturer. A director of the Petroleum Equipment Suppliers Association, Marshall's background includes many years of marketing-management experience in the rock-bit industry.

William P. Schneider becomes EIC's manager of engineering

W. P. Schneider

The announcement comes from Paul E. Madeley, president of Electrodynamic Instrument Corp., Houston. Schneider will direct the firm's engineering research and design programs in the fields of geophysical instrumentation, electronic components and subsystems, and oceanographic instrumentation. He was formerly a project engineer at Schlumberger Well Surveying Corp.

Crose-Perrault Equipment Corp. promotes L. D. Praytor

L. D. Praytor has been boosted from chief of the service department to sales and service, it was announced by the Tulsa firm. Praytor has been with Crose-Perrault for 5 years.

Parkersburg-Aetna Corp. forms divisions at Houston, Coffeyville

Jerry Williams

Jess Kern

The corporation's Houston unit, known as Parkersburg Process Equipment division, is under the direction of Jerry Williams. Williams has been with Parkersburg 11 years. Jess Kern takes over as manager of the Parkersburg Pumping Unit and Brake Division in Coffeyville, Kans. He has been with the corporation 4 years. Willi Stahl, chief engineer, has been named to fill the vacancy created by Williams' promotion.

William J. Whatley becomes regional mgr. for J&L Supply

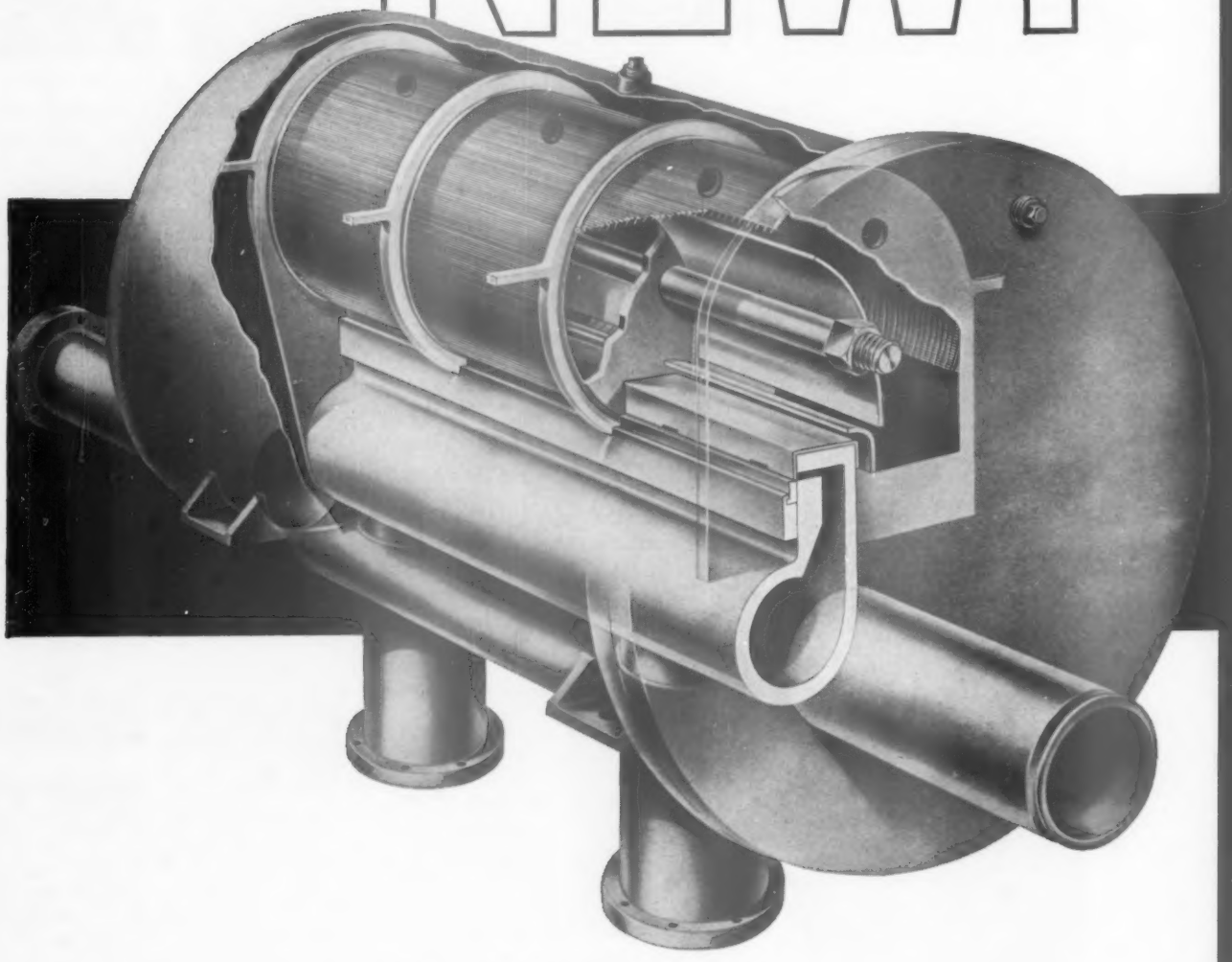
Whatley will supervise the division's central region, the headquarters of which will be moved from Tulsa to Oklahoma City. This region includes district offices, sales offices, and stores in Oklahoma, central Kansas, and Nebraska.

Whatley joined Jones & Laughlin in 1935 as a field salesman at Ada, Okla. In 1938 he was transferred to Oklahoma City as store manager. He was made a regional salesman in 1945 and became a city salesman in 1958. Whatley was promoted to city sales manager in 1959.

National Tube Div. names Fitch manager of sales, pipelines

Donald A. Fitch assumes the title of manager of sales, pipelines, for National Tube Division of U. S. Steel Corp., announces Walter P. Rhodes, general manager of marketing for the division. Fitch succeeds Arthur J. Elbert, Jr., who was named general manager of sales. Starting with National Tube as a sales trainee in 1947, Fitch later

NEW!



Principle of operation

Feed is introduced through a flat nozzle at sufficient velocity to travel around the 300 degrees of screen. All material coarser than 40 microns is collected on the surface and discharged. Liquid and minus 40 micron material passes through the wedge bars and collects in a separate compartment for return to process. As an example, a refinery had trouble in the distillation column due to particle breakover into the light phase of a two phase condensate system. Installation of 300° DSM Screen corrected the problem by treating 450 gpm of condensate containing 100 ppm of trace particles. Results: 95% of all solids removed in a 60% by volume concentration; distillation column returned to full efficiency operation.

THE DORR-OLIVER 300° DSM® SCREEN

...Provides high capacity separations down to 40 microns

A new development in wet screening techniques, the 300° DSM Screen provides unique operational advantages for the Hydrocarbon Processing Industries. From the standpoint of *efficiency*, the unit will positively remove all particles 40 microns or larger from production streams. On a *capacity* for size basis, a single unit occupying only 9 cubic feet can handle 500 gallons per minute. And for design *flexibility*, DSM Screens can be supplied for atmospheric, vapor tight, vacuum or pressure operation. There are no moving parts and pump pressure is all that is required for operation.

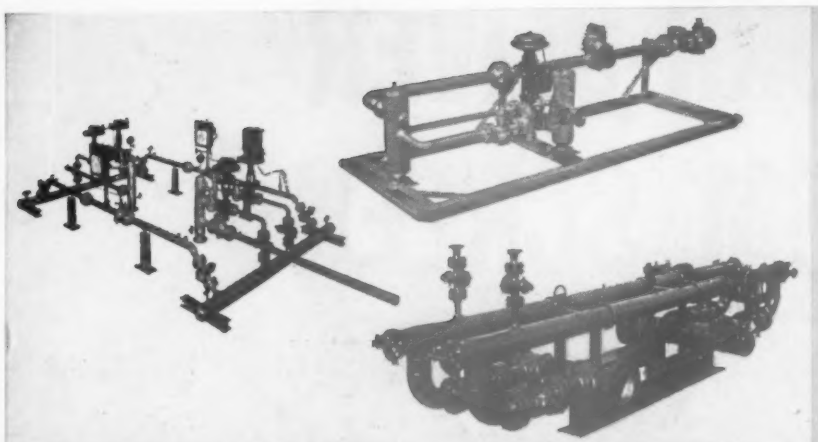
Typical applications include:

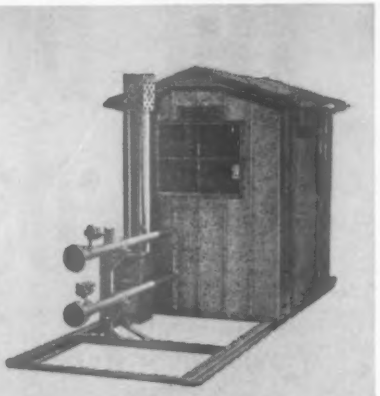
- Removal of trace impurities in condensate lines from stripping operations.
- Counter-current washing or extraction in any number of stages.
- Classification of polymer crystals.
- Protection of phase separators in multi-liquid phase systems.
- Protection of distillation columns.

If you have a liquids-solids separation problem involving high capacities, small particles, any or no difference in specific gravities, or two or more liquids, it will pay to investigate the 300° DSM Screen. As performance characteristics vary with the material being handled, Dorr-Oliver has trial units available on a minimum rental basis for pilot or semi-works testing. For more information, write to Dorr-Oliver Incorporated, Stamford, Connecticut.

DORR-OLIVER

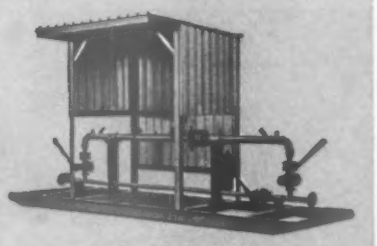
WORLD-WIDE RESEARCH • ENGINEERING • EQUIPMENT





PACKAGED METER STATIONS

Start measuring gas immediately at the wellhead or at city gate sites with Daniel packaged, orifice meter stations. You save time in delivery, and save money in field labor costs with a complete Daniel package ready for tie-in to your line. Here are just a few examples of portable, skid-mounted units built by Daniel to customers' specifications. Each unit can be tested and X-rayed at the modern Daniel plant before shipping, and fitted with the meters of your choice. Want more facts? Write for Bulletin MS-1.



DANIEL ORIFICE FITTING COMPANY

9720 Katy Road
Houston 24, Texas

3352 Union Pacific Avenue
Los Angeles 23, Calif.

EZY-VUE
PRESSURE GAUGE

THE FIRST ACCURATE PRESSURE GAUGE For Applications Requiring... RUGGEDNESS and DEPENDABILITY

CAPACITIES: 3,000, 5,000, 6,000, 10,000, 15,000 PSI Metric Equivalents Available.

MARTIN DECKER

WRITE FOR DESCRIPTIVE LITERATURE
MARTIN-DECKER CORPORATION, DEPT. P-60
3431 CHERRY AVENUE, LONG BEACH 7, CALIF.

World's principal manufacturer of Oil Well Drilling Instrumentation

the oil bank of Denver

that's the bank for my money!

DENVER U.S. NATIONAL

Denver U.S. National Center, Denver 17, Colorado

MEMBER FEDERAL DEPOSIT INSURANCE CORPORATION

was assigned to the Denver sales office.

In 1952 he was shifted to the Dallas and Fort Worth sales area where he served until 1957. He was then appointed assistant manager of sales, pipelines, with headquarters in Pittsburgh, the position he held until his present promotion.

Dunwoody Pipe & Supply Co. expands supply-store operations

Expansion of operations to include a series of oil-field-supply stores in strategic areas has been announced by the Houston-headquartered Dunwoody Pipe & Supply Co. President L. Ray Dunwoody announced that the first store is now in operation at Houma, La., and that other stores would open in the immediate future in Houston and south Texas, with more to follow.

At the same time, William W. Carhriner, Dunwoody sales manager, announced that the company had been appointed a distributor for Pittsburgh Steel Co. Other manufacturers of tubular products which the company now represents include Kaiser Steel, Kilby Steel, Gulf States Tube, and Babcock & Wilcox.

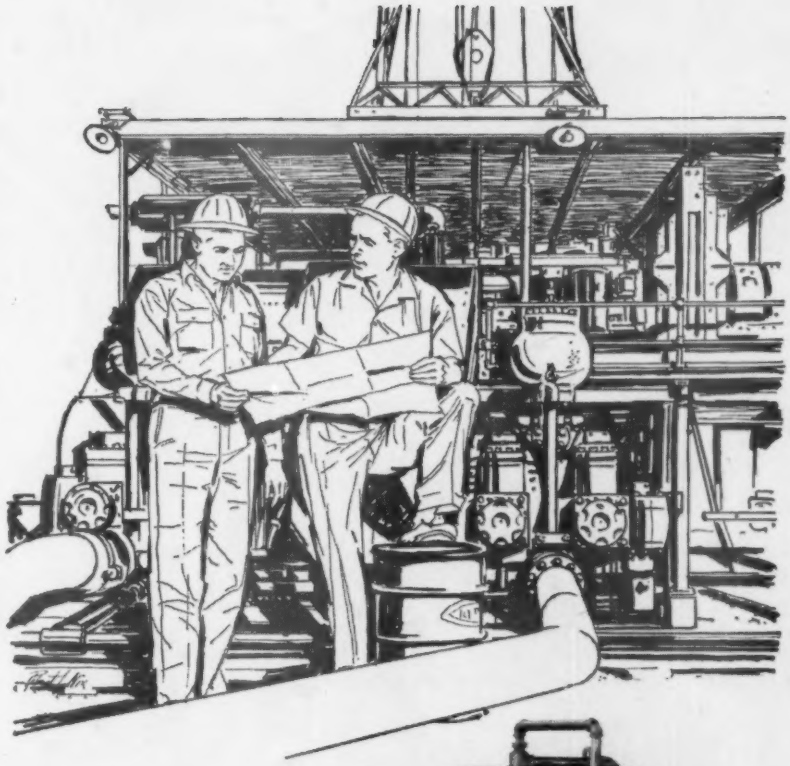
AOSC national convention will be held in Dallas

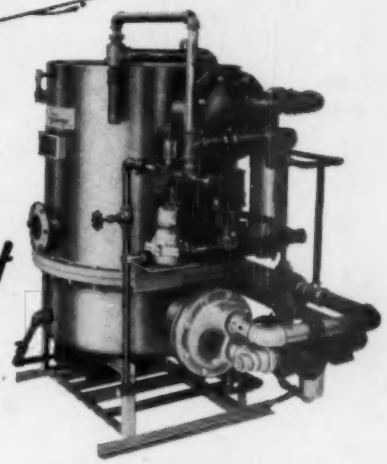
The Association of Oilwell Servicing Contractors will hold its 1962 national convention at the Baker Hotel in Dallas, January 18, 19, and 20. Lamar DeuPree, new executive secretary, stated convention plans will bring several leading producers and nationally known figures together for the main speakers.

To meet increasing interest in the association by firms active in the oil industry where their business is not necessarily well servicing, a new membership class has been authorized and will be known as the Allied Group. Present Associate Group membership, manufacturers, and suppliers will remain unchanged.

Foxboro Co. appoints three to sales managerial posts

Earle W. Pitt has been named western field sales manager of Foxboro, according to H. O. Ehrisman, vice president in charge of sales. Also announced were the appointments of Earl M. Kelly as regional manager of the Cleveland territory,





And you can't get far without Fresh Water

That's why more and more producers are making their own fresh water on the spot with the new compact Aquavap evaporator. All you need is a good supply of water, salt or brackish, and an engine to tap for jacket water which acts as the heat source for the evaporator. That's all the heat you need. Inexpensive, simple to install, easy to operate, Aquavap produces water of a purity exceeding U.S. Public Health Service requirements. It is delivered as a packaged unit ready to install. Capacities range from 150 to 12,500 gallons per day of fresh water.

For further details write Dept. O for this new Aquavap Bulletin.

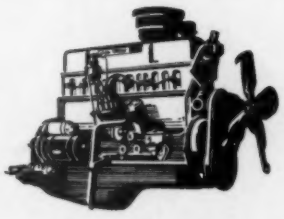
AMF **American Machine & Foundry Company**
MAXIM EVAPORATOR DIVISION
WATERFORD, CONN. • Branch, DENVER, COLO.

Represented by **THE J. B. BEAIRD COMPANY,** Shreveport, New Orleans, Tulsa, Midland, Houston, New York

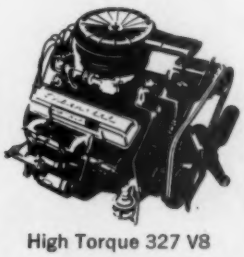
THE STUFF THAT WHEELS ARE TURNED BY

The accent's on torque in a big way for '62, in Chevy's new High Torque power lineup for medium- and heavy-duty trucks. New features, new performance characteristics, and even two brand-new extra-displacement V8's are tailored throughout the line to deliver a heaping hoodful of bulling, bruising torque—to dig in and move out under full capacity loads without a fuss. You'll find Chevy's brand of performance gives you a new kind of mastery over the toughest jobs you tackle, with brute-force breakaway power that just won't take no for an answer. There's no such thing as "no can do" when you're powered up the Chevy High Torque way!

High Torque 261 Six—Standard in Series 60 and 60-H models (GVW's up to 23,000 lbs.). Ideal for hauls that call for load-lugging High Torque power *plus* proved 6-cylinder economy. Delivers 235 ft.-lbs. of torque and 150 hp to handle maximum loads with low-cost efficiency. This engine backs up your bank account with brute strength to spare—with a forged steel crankshaft, high-alloy inlet valves, hard-faced exhaust valves with Rotocoils and much more.

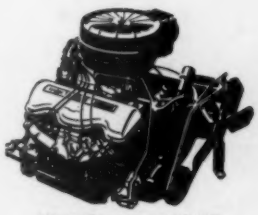


High Torque 261 Six

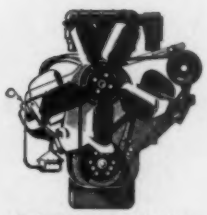


High Torque 327 V8

High Torque 327 V8—Optional at extra cost in Series 60 and 60-H (GVW's up to 23,000 lbs.). It's Chevy's newest and biggest medium-duty engine, ready to turn to with 305 ft.-lbs. of hard-pulling torque and 185 hp to tame your toughest jobs. Efficiency stays up, operating costs stay *low* with top-quality features like these: fuel-metering Power-Jet carburetor, durable precision bearings, aluminized inlet valves, hard-faced exhaust valves and full-flow oil filter.



High Torque 348 V8



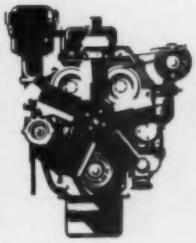
High Torque 409 V8

High Torque 348 V8—Standard in Series 80 models (18,500- to 25,000-lb. GVW range). Provides 220 hp and 325 ft.-lbs. of torque to keep big loads moving at lowest cost. Comes equipped with scores of heavy-duty design features such as inside/outside carburetor air system that helps stabilize air supply temperature, highest quality valves and bearings, precision-engineered lubrication, cooling and ventilation systems. This one assures years of low maintenance, high mileage operation.

High Torque 409 V8—Optional in Series 80 models (18,500- to 25,000-lb. GVW range). It's the biggest, *pullingest* engine that ever powered a Chevy heavyweight. With a whopping 252 hp and 390 ft.-lbs. of torque, the High Torque 409 V8 is made to order for *extra* rugged runs. Long life and trouble-free performance are sure things, thanks to such special heavy-duty features as induction-hardened valve seats, forged steel crankshaft, new 4-barrel carburetor, to mention just a few. (For *all* the details on High Torque power for your job, see your Chevy dealer.)... Chevrolet Division of General Motors, Detroit 2, Michigan.

PLUS NEW GENERAL MOTORS SERIES 53 DIESELS

For '62 Chevrolet introduces new GM Diesels for medium- and heavy-duty trucks! Specially designed for lowest cost performance in Series D60 and D60-H (15,000 to 23,000 GVW) is the proved 130-hp GM 4-53 Diesel. And, for haulers who work in the Chevy Series 80 range (18,500 to 25,000 lbs.), the new 195-hp GM 6V-53 Diesel will be available soon. If you work your trucks near the limit with heavy loads, high mileages, severe stop and go or excessive idling, you're in for a pleasant shock when you find out how much a Chevy Diesel can save you!



built to keep running and running and running and running and running and running and running and running

1962 CHEVROLET JOBMASTER TRUCKS

CHEVROLET

Spans creek in one day with pre-fabricated pipe arch

THIS self-supporting river crossing for a 20-inch gas pipeline was installed by Laclede Gas Co. in just one 12-hour working day. Midwest Piping pre-fabricated the entire 150-foot arch and its base headers in only two sections, each consisting of a converging pair of 16″ pipes.

The only installation of its type in the country, the arch is capable of carrying 200 million cubic feet of gas daily at 880 psi over the solid rock bed of Coldwater Creek north of St. Louis. For complete information on Midwest Piping's products and services, write for Bulletin 61A, PIPELINE FITTINGS.

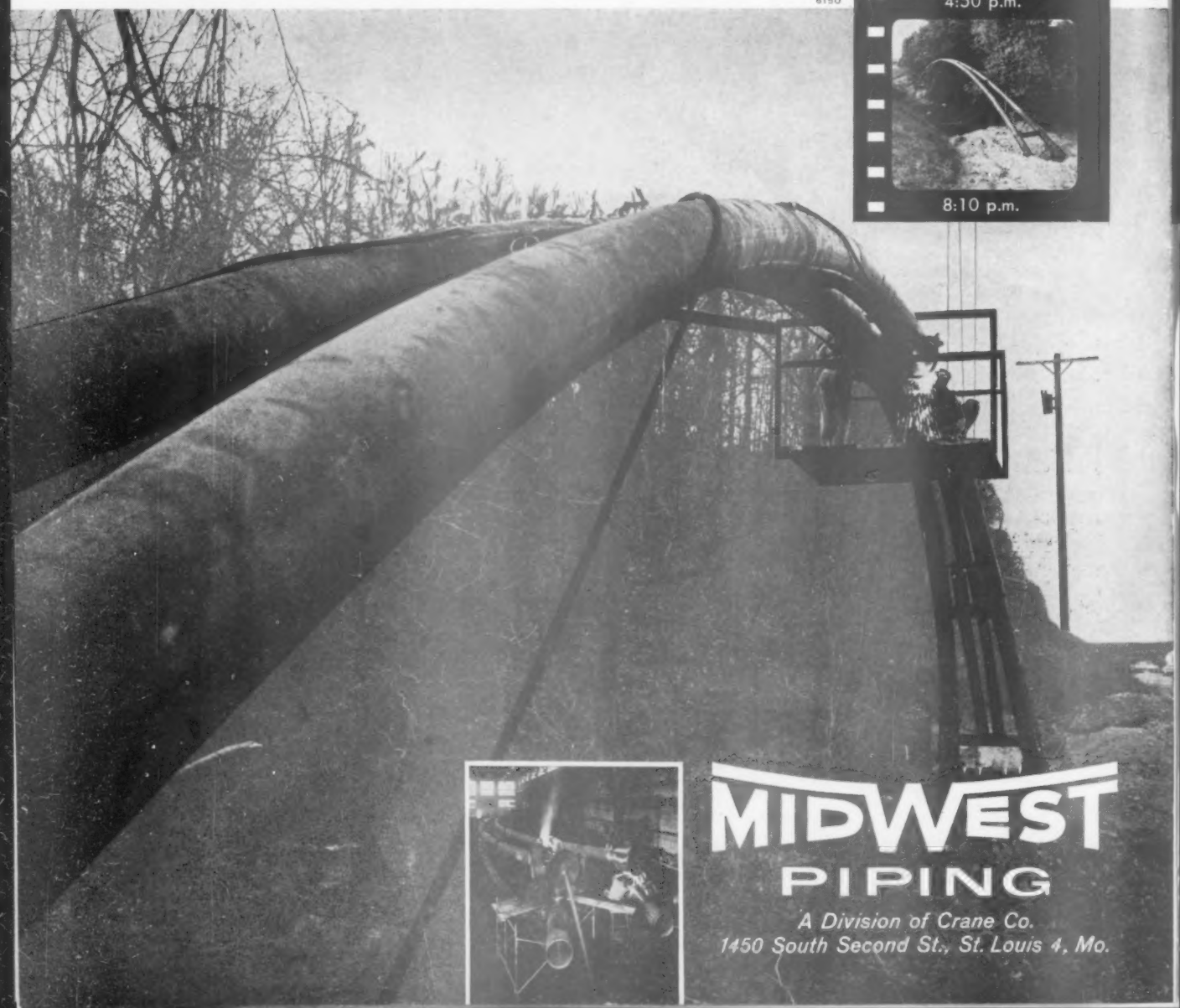
6150

8:05 a.m.

11:00 a.m.

4:50 p.m.

8:10 p.m.



MIDWEST
PIPING

A Division of Crane Co.
1450 South Second St., St. Louis 4, Mo.

and Steve V. Kerstner as branch manager of the company's Los Angeles office, replacing Pitt.

Pitt joined Foxboro in 1948 as a sales engineer in the Dallas office. In 1951 he was named manager of the office in Shreveport, and in 1955 became branch manager at Los Angeles. Kelly, assistant regional manager of the Cleveland territory the past year, replaced Harvey L. Lee who died recently. For the past 6 years, Kerstner has been a sales engineer with the company's Los Angeles branch.

C. E. Lamar named president of Southern Pipe Division

C. E. Lamar

U. S. Industries, Inc., has announced that D. A. Stromsoe, president of its Southern Pipe Division at Azusa, Calif., has retired and that Charles E. Lamar, executive vice president, has been appointed to succeed him as division president. The retiring president, who has been with Southern Pipe since its founding in 1932, will be retained by the division as a consultant.

Lamar has been with Southern Pipe since 1951. In the past decade he has served successively as sales manager, vice president of marketing, and executive vice president.

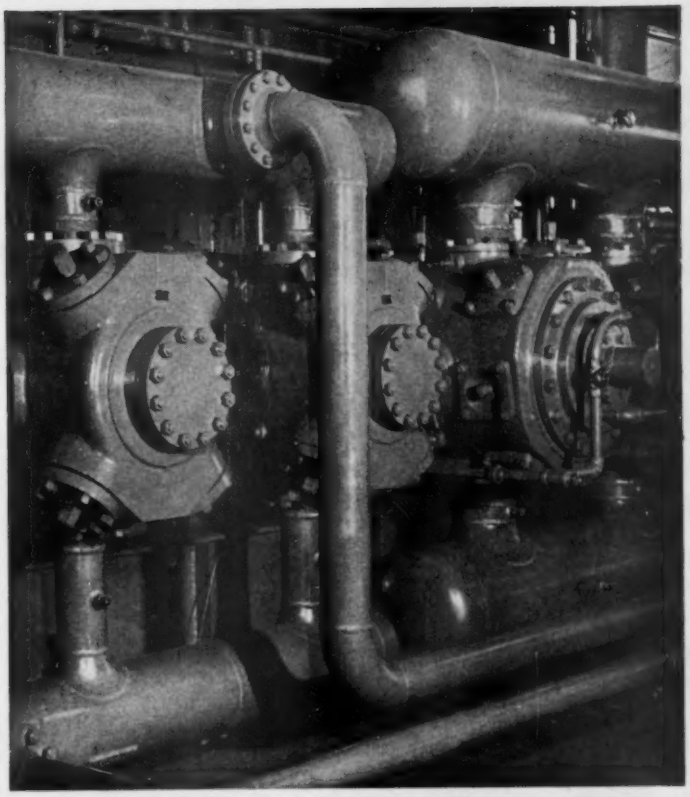
Stone & Webster Engineering elects two to board of directors

Election of Thomas A. Fearnside and Dr. Arthur J. Good to the board of directors of Stone & Webster Engineering Corp., of New York and Boston, has been announced by President F. W. Argue. Fearnside joined the company in 1940, became engineering manager in 1960, and was named a vice president earlier this year. Good was appointed comptroller of Stone & Webster in 1957, a vice president in 1958, and treasurer in 1960.

Harry C. Loehr, Jr. joins Milwhite Mud Sales Co.

He will serve as a city salesman with headquarters in Houston. Previously Loehr was with Bullard Drilling Co.

PACKAGED COMPRESSOR PIPING...



another example of

BONNEY SWEEPOLETS®

for sophisticated piping systems

Designed to eliminate all notch effects, the Bonney Sweepolet provides optimum stress distribution for critical piping systems such as the compressor bottles shown above on Worthington SLHC-10 gas engine angle compressors rated at 950 BHP each. These units were fabricated by Worthington-Lockett using Bonney Sweepolets for branch construction. Specify and use Bonney Sweepolets in your critical piping systems.

BONNEY

also exclusive manufacturers of
WELDOLETS®
THREDOLETS®
SOCKOLETS®
ELBOLETS®
BRAZOLETS®
SWEEPOLETS®
• • • • • • • • • • •
CARBON STEEL
STAINLESS
ALLOY
for all services

BONNEY FORGE AND TOOL WORKS
ALLENTOWN, PENNSYLVANIA

Trunkline waltzes through Vienna

The firing line welds multiple pipe joints for one of many road crossings.

That's Vienna, Illinois, a key point on Trunkline Gas Company's main line bringing natural gas from Texas and Louisiana to midwestern customers.

The snaking operation you see here took place in late spring of 1961, as Trunkline sped ahead with the construction of 154 miles of 30-in. x .361-in. main-line loops. Pipe for this 21-mile spread, extended north from Vienna, was supplied by Bethlehem Steel, and laid by Western Pipe Lines, Inc. We also furnished the pipe for Trunkline's 20-mile loop north of Oak Grove, Louisiana, where Panama-Williams, Inc., was contractor.

These days you can find Bethlehem High-Test Line Pipe on more spreads than ever before. That's because we recently expanded our output to meet the increasing demand for top-quality line pipe in diameters clear up to 42 in.!

Bethlehem Steel offers a full line of line pipe: From Sparrows Point, Md.—continuous buttweld from ½ through 4 in., nom., and electric resistance-weld from 5⁹⁄₁₆ through 16 in., OD. From Steelton, Pa.—electric fusion-weld from 18 through 42 in. OD. All Bethlehem line pipe meets appropriate API standards.

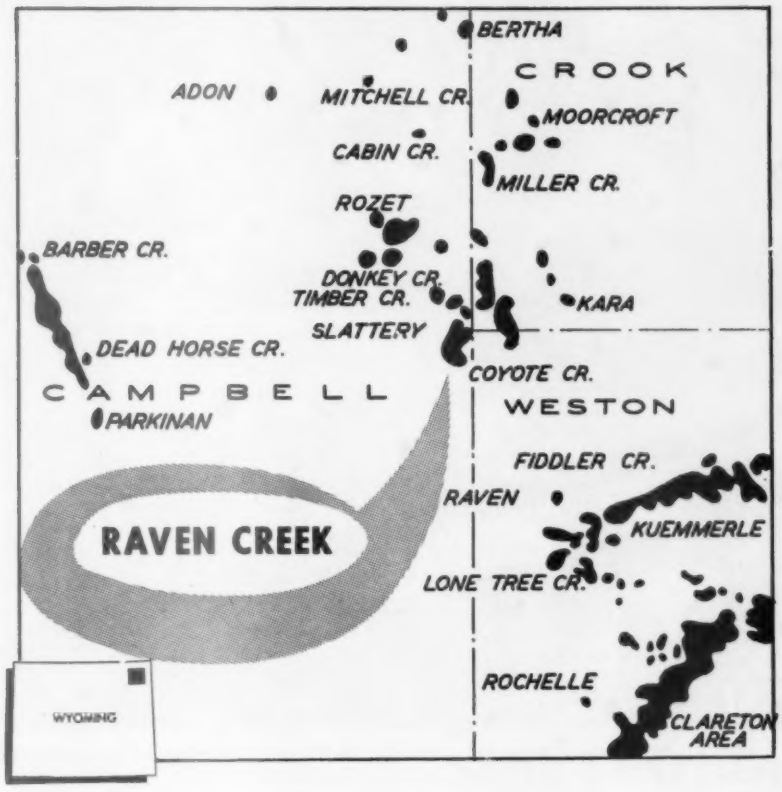
Steel

for Strength
... Economy
... Versatility

BETHLEHEM STEEL COMPANY, Bethlehem, Pa. *Export Sales:* Bethlehem Steel Export Corporation

BETHLEHEM STEEL

BETHLEHEM STEEL



DATA ON

ACTIVE FIELDS

Raven Creek, Campbell County, Wyoming

1. Approved field name: Raven Creek. Location: Eastern edge of Campbell County in Northeast Powder River basin of Northeast Wyoming.

2. Discovery well: (Minnelusa sand) Kewanee Oil Co. 1 Norman. C NE NW 14-48n-69w, Campbell County, Wyoming. IPP 440 BOPD at 8,338-65 ft., discovered March 18, 1961.

3. Trend of development: Southeast to northwest.

4. Number of producing wells: 32.

5. Spacing pattern: 80 acres.

6. Proved acreage: 2,480.

7. Principal operators in area: Kewanee Oil Co., Mobil Oil Co.. Shell Oil Co., Clark Oil & Refining Co., and E. M. Davis.

8. Present allowable: Not prorated.

Drilling Operations

9. Active drilling rigs: 2.

10. Casing program: 9⅝-in. surface set at 360 ft. with 175 sacks of cement. 5½-in. oil string set at 8,466 ft. with 350 sacks of cement.

11. Average drilling time per well: 21 days.

12. Types of drilling fluid: Gyp-base mud, 9.5 lb. per gal., water loss less than 10 cc. per 30 min.

13. Completion methods: Perforate casing, 500 gal. acid, fracture with 10,000 lb. and 10,000 gal.

14. Types and sizes of bits: Total of 22 rock bits, 7⅞-in. size.

15. Special drilling problems: None.

HEVIWATER completion fluid avoids use of mud

Since inhibited Heviwater* is free of solids, it helps operators avoid problems such as pay contamination and the sticking of packers due to the settling out of solids.

Heviwater can be furnished pre-mixed or it can be mixed at the well site using rig equipment. Dowell supervision for mixing is available upon request at no cost.

This table shows the materials which can be used, in addition to fresh water and corrosion inhibitors, to provide various fluid weights of Heviwater:

FLUID WEIGHT (LBS/GAL)	MATERIALS USED
8.33-10.0	NaCl
8.33-11.0	NaCl + $CaCl_2$
8.33-11.8	$CaCl_2$
11.8 -14.0	$CaCl_2$ + $ZnCl_2$

Heviwater can be made available wherever this type of completion fluid is needed. Ask your Dowell representative for full information. *DOWELL TRADEMARK

PRODUCTS FOR THE OIL & GAS INDUSTRY

DOWELL

DIVISION OF THE DOW CHEMICAL COMPANY

Pipe Inspectors' specialized electronic equipment inspects used tubing.

Now you can get the "inside story" on used tubing

Before you run used tubing, you want to know how good it is. And the answer is the "inside story" hidden within your tubing.

The electronic Pipe Inspectors equipment shown here was designed specifically to inspect used oilfield tubing and to give you the information you need. (Other electronic Pipe Inspectors equipment was specifically designed to inspect used *drill pipe*.)

Pipe Inspectors' used tubing units are precision electronic inspection tools that scan each 90° segment of your tubing separately and simultaneously. They rapidly and accurately detect and permanently record flaws, pitting, and transverse cracks.

Pipe Inspectors also provides conventional inspection services, including full-length electromagnetic external inspection, end-area electromagnetic inspection, and internal optical inspection.

Offices: Houston and Odessa, Texas; Harvey, Lafayette and Morgan City, Louisiana; and Laurel, Mississippi.

DIVISION OF PLASTIC APPLICATORS, INC.

PIPE INSPECTORS

Geology

16. Producing formations: Pennsylvanian-Minnelusa sand at 8,300-8,400 ft.

17. Reservoir characteristics: Dominant factor of type drive is disputed whether it is solution gas or water drive. Gas-oil ratio: 50-70:1. Oil-water contact −4,150. Gas-oil contact: None.

18. Geologic markers: Niobrara 5,210 ft.; Newcastle 6,720 ft.; Dakota 6,950 ft.; Minnekahta 8,304 ft.; Opeche 8,330 ft.; and Minnelusa 8,374 ft.

19. Type trap: Monoclinal structure associated with an unconformity.

20. Core data: Porosity 15%, permeability 100 md., residual oil saturation 17-18%, total water saturation 30-38%, cored interval—top 50 ft. of Minnelusa "B" sand section, net feet of pay 35 ft.

21. Estimated recovery: 125-300 bbl. per acre-ft.

22. Tubing and casing pressures: All wells are pumped. Casing is 11 psig.

23. Tests and logging procedures: Core, gamma ray-sonic log, Laterolog.

24. Pipeline outlet: Belle Fourche.

25. Exploration methods prior to discovery: Seismic and subsurface.

26. Average costs: Dry hole $50,000. Pumping well: $130,000. Average total depth: 8,500 ft. Footage rate: $3.85. Day rate: $1,000 with pipe.

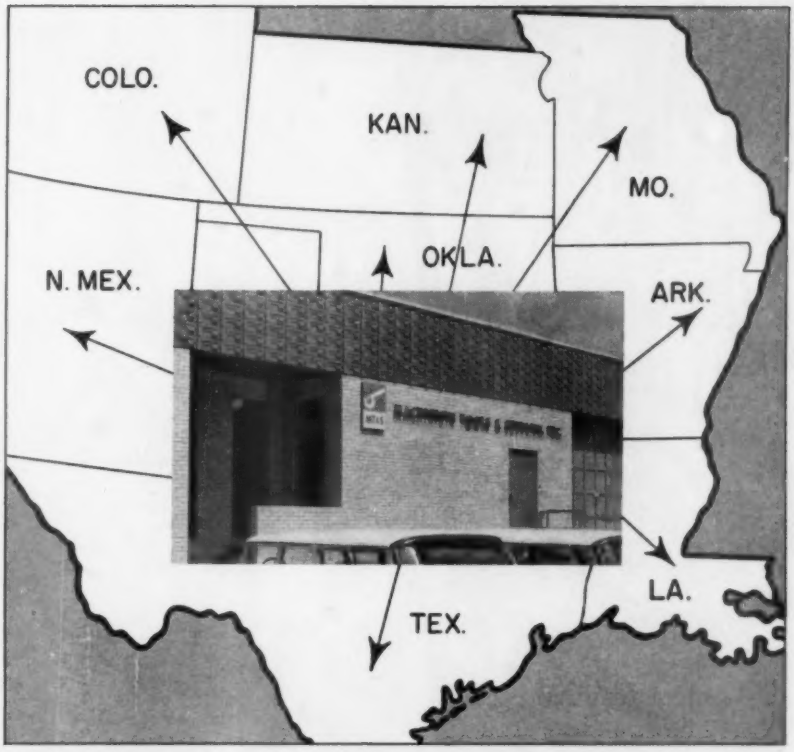
27. Crude analysis: Gravity, 33° API; sulfur 1.25%; viscosity at 70° F. 54.6 sec. S.U.; viscosity at 100° F. 47.8 sec. S.U; pourpoint −20° F; b.s. and w. 3.0% by volume; specific gravity at 60° F. 0.860.

28. Yield data: Gasoline 24% and gas-oil 14%.

Next A & M drilling course is in February

THE FIFTH Advanced Drilling Engineering Course was completed last month and the next session is set for February 19 through March 2, 1962.

These 2-week courses are offered to petroleum-industry personnel by the Petroleum Engineering Department of Texas A & M College, which is headed by Prof. R. L. Whiting. Lectures by faculty members are supplemented by drilling-industry experts.



New B&S pump warehouse, operated by Machinists Tools & Supplies, Inc., 1307 Chemical St., Dallas, serves 8 states.

New Dallas Warehouse speeds delivery of Brown & Sharpe Pumps to the Southwest

You get your B&S pumps faster-usually overnight - save money on freight

Do you operate in Texas, Louisiana, Arkansas, Missouri, Kansas, Oklahoma, Colorado, New Mexico?

If so, you can get Brown & Sharpe pumps easier than ever before.

Our new Dallas warehouse helps keep your supply store "in stock" with overnight deliveries in these states.

Brown & Sharpe's dependable pumps, for every industry, are now at your front door—and at a lower price, too. You pay F.O.B. Dallas.

Save time, money and maintenance. Ask your supply store or industrial distributor for dependable, long-lasting *Brown & Sharpe* pumps!

Hydraulics Division, Brown & Sharpe Mfg. Co., Providence 1, Rhode Island.

Brown & Sharpe
PRECISION CENTER

First joint of Pittsburgh Steel casing is ready to enter hole drilled near the 1907 scene pictured below.

THE ROUGHNECKS WORE DERBIES

Roughnecks casually pour nitro into well preparatory to shooting in the early Bradford field in Pennsylvania about 1907.

Pioneer Independent Distributor Now Sells Pittsburgh Steel Oil Country Goods From New York To Texas

Roughnecks wore derbies and horsepower had tails when one service-minded Pittsburgh Steel Co. independent distributor began operations in the pioneer Pennsylvania grade field.

Today, 54 years later, his flexibility, imagination and personal service still make the difference.

This typical "Mr. Independent" now provides oilmen in eight states with seamless tubular products

Roughneck cleans threads on Pittsburgh Steel seamless casing before running it into hole. Independent distributor who sold this casing has handled Pittsburgh Steel's tubular goods for nearly a quarter-century.

Inspecting joint ends are Peter E. Douylliez, Pittsburgh Steel Co. field engineer; Homer Ferringer, foreman for Manufacturers Light & Heat Co.; and Mark Wagner, salesman for distributor.

made by Pittsburgh Steel Co., a pioneer in its own right, whose experience with oil country goods goes back to almost the turn of the century.

• **From Soft Hats To Hard Hats**—As an early distributor whose history started in 1907, this Mr. Independent grew and flourished with the expanding industry and his stores followed the new fields across two-thirds of the continent.

Now he supplies oilmen in Texas, Oklahoma, Michigan, Pennsylvania, New York, Indiana, Kentucky and Illinois.

Three generations of the same family have run the business with the grandson of the founder now in the president's office.

With service and good products as a foundation, this distributor built up a wide range of shop facilities and repair equipment until now he is unique in the field. Nearly a quarter-century ago, he began supplying his customers with seamless tubular products made by Pittsburgh Steel Co., also a pioneer in its field. Let Mr. Independent tell you himself why these two veterans—an independent distributor and a mill that sells only through non-captive outlets—work together so well.

• **Lots Of Help**—"We get awfully rough competition from some of the big fellows. But we make out by being flexible, imaginative and by giving personal service.

"Pittsburgh Steel gives us a lot of help. The mill bends over backward to cut red tape and it moves fast when it's necessary to get some quick action."

You can't do better than making a connection with an independent Pittsburgh Steel distributor. His only obligation is to his customers.

For your next order of drill pipe, casing or oil well tubing, get in touch with one of the Pittsburgh Steel independent distributors listed below.

Distributor Home Offices

Atlas Bradford Company
Houston, Texas

Bennett Supply Company
Midland, Texas

Buckeye Supply Company
Zanesville, Ohio

C. W. Cotton Supply Company
Tulsa 5, Oklahoma

Dunwoody Pipe & Supply Co.
Houston 2, Texas

Franklin Supply Company
Denver 22, Colorado

Houston Oil Field Material Co.
Houston, Texas

Industrial Supply Company
Wichita Falls, Texas

Iverson Supply Company
Dallas 1, Texas

Lion Supply Company, Ltd.
Calgary, Alberta, Canada

Longhorn Supply Co., Inc.
Houston 14, Texas

Lucey Export Corporation
New York 7, New York

Lucey Products Corporation
Tulsa 19, Oklahoma

McAdams Pipe & Supply Co.
Bristow, Oklahoma

McJunkin Corporation
Charleston 22, West Virginia

Midland Supply Company
Wichita 7, Kansas

Mountain Iron & Supply Co.
Wichita 2, Kansas

Oil Equipment, Ltd.
Calgary, Alberta, Canada

The Producers Supply & Tool Co.
Fort Worth 2, Texas

Sandy Supply Company
Wooster, Ohio

Southwest Supply Company
Pittsburgh, Pennsylvania

Superior Iron Works & Supply Co.
Shreveport, Louisiana

Tex-Tube, Inc.
Houston 7, Texas

Triangle Supply Company
Abilene, Texas

Western Supply Company
Tulsa 1, Oklahoma

Pittsburgh Steel Company

Grant Building • Pittsburgh 30, Pa.

DISTRICT SALES OFFICES

Atlanta, Chicago, Cleveland, Dallas, Dayton, Detroit, Houston, Los Angeles, New York, Philadelphia, Pittsburgh, Tulsa, Warren, Ohio

Steel

HALLIBURTON FORMATION TESTING DELIVERS INFORMATION IN DEPTH

Halliburton formation tests are designed to provide the greatest amount of information possible . . . even interpretation and calculation service to help you in making the decision whether or not to complete.

Halliburton Testers are "well-site" experienced. They came up through the ranks where they learned to cope with the complexities of formation testing. Behind every Tester are the many engineers and technicians who give depth to Halliburton Formation Tests.

The proof of performance is satisfied customers. We have a long list of them, dating back to 1926, the very beginning of formation testing . . . and we invite you to join them.

Interpretation and Calculation Service
. . . another Halliburton testing advantage

TESTING SERVICES

Halliburton
COMPANY • DUNCAN, OKLAHOMA

Exploration

Oil and Rome —a parallel?

BY FRANK J. GARDNER

YOU'VE NO DOUBT heard of the Roman Empire . . . and how it fell?

Well, the Romans had nothing on us. Only, they failed because of a food shortage. In our case, it could be oil.

That striking parallel was drawn in the keynote address to the fourth annual meeting of the Southwestern Federation of Geological Societies in El Paso last week. Warren L. Taylor, manager of the geological and exploration department of El Paso Natural Gas Co., warned his audience that unless they can plot and submit to management some economical exploration programs that will sustain our reserves, the geological profession, and the economy in general, the parallel might carry to the very end.

"The Roman soldier . . . could and did march across Europe, Asia, and Africa," Taylor said. "During the earliest days, the republic possessed a competent agriculture. Then, as the legion conquered more and more of the fertile earth, an abundance of food from newly conquered provinces made it increasingly easy to withdraw men from agriculture and place them under arms . . .

"But then several temporary combinations of circumstances went to work. First, the number of men available for military service increased. This was followed by an increase in the rate of successful conquests. However, shortly thereafter the production of **domestic** agriculture decreased. At the same time, foreign foodstuffs were becoming cheaper, but before long the division of spoils led to urbanization and ultimately to the loss of an agricultural industry, and in the end, a disciplined simple civilization was unable . . . to feed itself."

El Paso's Taylor: "Oil now . . . food then."

The American oil industry's success in foreign exploration has outdone all the conquests of the Romans, according to Taylor. But this success has come at the expense of attrition in the ranks of explorationists.

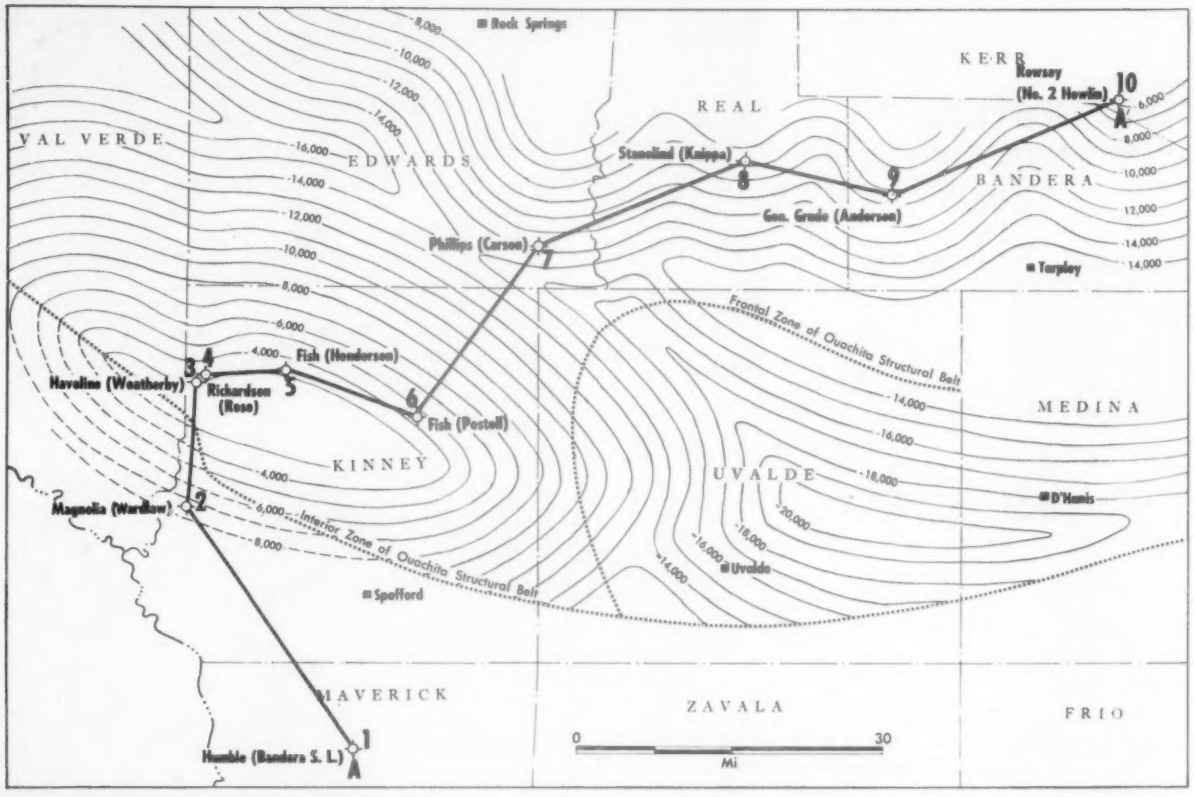
"Our accomplishments have been achieved under conditions quite parallel to the circumstances under which Rome lost its agriculture," Taylor cautioned. "The subject of energy in the modern age versus energy in the time of the Roman Empire is one of 'oil now—food then'."

And the parallel is much too analogous for comfort, Taylor believes. He drew two specifics: first, the rate of successful foreign exploration has increased; second, the number of trained explorationists available for a healthy domestic industry is decreasing.

No longer can we expect that the situation will remedy itself, according to Taylor. "Entirely new problems have developed in an age when technology daily transforms our pattern of living in an era of ferment and revolution," he said. "The greatest contribution we can make to our industry is to establish . . . a future program of exploration which can withstand the precedent-shattering change of pace."

And that program must be established in the face of some very important problems. Among these: payout, profit-to-investment ratio, average annual profit refund, total cost per net barrel, and capital cost per net barrel. In short, Taylor contends that "the successful explorationist must now become a split personality . . . He must work in the here and now and concurrently plan in the world of tomorrow."

The speaker predicted finally that the peaks and valleys in exploration may be expected to continue in the future, but that they might arrive in no predictable fashion.



LOCAL EXPRESSION of the 900-mile Ouachita trend is comprised of the Devils River uplift (Wells 2-6) in this portion of Southwest Texas. Fig. 1.

Will basement rocks provide the key to

Texas' largest unexplored trend?

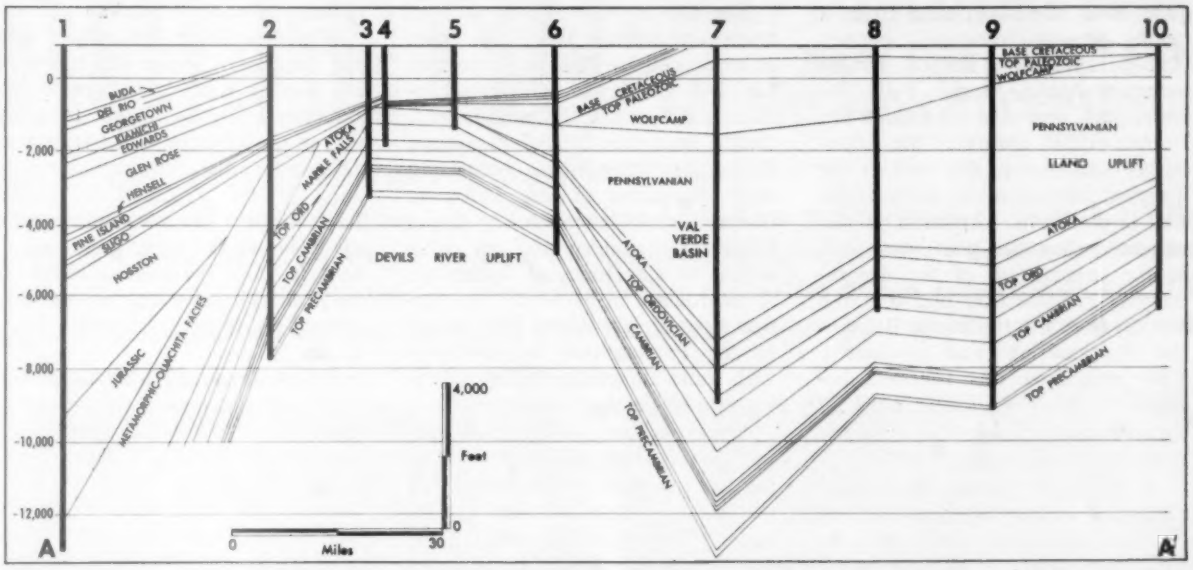
THE AUTHOR, right, is shown with Clinton G. Brown, Jr., of San Antonio, attorney and coowner of Dunbar Land Co. Cunningham entered the oil industry as a roughneck in the Hastings boom in 1937. In May 1939, he financed his first well in Duval County, which was abandoned as the second deepest test in the county at 6,500 ft. During WW II he was a first lieutenant with the Corps of Engineers in France and his unit, military pipeline, laid a 635-mile line from Marseille, France, to Mannheim, Germany. After the war Cunningham went to Laredo and was engaged in drilling, production, and geological work. During the next few years he found several new oil fields. In 1956 he moved to San Antonio where he continued as an independent producer.

BY SAM CUNNINGHAM
Independent producer
San Antonio

BASEMENT structure often furnishes a key to the location of new oil fields. This report deals with an area where evidence of such structure exists.

Probably the largest unexplored trend in Texas has been the subject of an extensive research project by the Bureau of Economic Geology of the University of Texas under the direction of Dr. Peter T. Flawn.

This trend, known as the Ouachita structural belt, is composed of deformed rocks that are lithologically and faunally similar to those which are exposed in the Ouachita Mountains of southwestern Arkansas and southeastern Oklahoma and strike southward into Texas. The belt continues southwestward, curving sharply around the eastern flank of the Llano uplift in Central Texas, and trends westward into Southwest Texas. The Ouachita structural



POORLY DEFINED and little tested are the environs of the Devils River uplift and the Val Verde basin. The few wells that have been drilled do not fully define either feature nor did they test the stratigraphic section to the northwest or the southeast of the uplift. The relationship of the frontal and interior zones of the Ouachita belt are seen in cross-section. Fig. 2.

belt, for nearly all of its 900-mile length across the state, comes into view only in the central part of the state where the steeply dipping rocks of the front are exposed in the Turkey Bend area of Lake Travis and again in far Southwest Texas where a structural salient of folded and thrust-faulted rocks of Ouachita facies is exposed in the Marathon uplift.

In all of the 900-mile length of the belt across the state there are comparatively few wells that have penetrated rocks of the structural belt and sedimentary rocks of the immediately adjacent foreland shelf and basins. Such sparse well control means that only major features of the belt can be recognized with any confidence.

One of these features, located in southern Kinney and Val Verde counties, is known as the Devils River uplift, which is a northwest-southeast trending area of high-standing Precambrian in the subsurface (see Fig. 1). Because of lack of well control, the feature is poorly defined and its northwestern terminus is not known. The axis of the structure is indicated by the surface expression in the overlying Cretaceous rocks (Calvert—1928, p. 81), and by sparsely drilled key wells which either penetrated the Precambrian or were bottomed in overlying formations near the Precambrian.

The subcrop of the Ouachita structural belt is composed of two well-developed tectonic zones:

1. A frontal zone composed of unmetamorphosed to very weakly metamorphosed folded and faulted Lower and Upper Paleozoic rocks of Ouachita facies (locally the frontal zone includes foreland facies rocks along the frontal margin of the belt) and,

2. An interior zone of highly sheared low-grade metamorphic rocks (slate, phyllite, fine-grained schist, metaquartzite, marble, and, locally altered volcanic rocks) of unknown age.

The geologic relationship lies in the recognition of the fact that wells in the area have penetrated highly sheared metamorphic rocks of two distinct ages and two distinct provinces: Precambrian rocks that are part of the foreland Devils River uplift and allochthonous rocks of unknown age that are part of the interior zone of the Ouachita belt. The relationship between these two groups of metamorphic rocks is shown in the cross-section (Fig. 2). The Precambrian rocks of the uplift appear to be mostly metavolcanic. The rocks of the interior zone are mostly sedimentary rocks, metamorphosed as the result of the thrust against the resistant mass of Precambrian metavolcanics (Fig. 2).

In the area of the Devils River uplift, the frontal zone of the Ouachita belt is missing in the subcrop. Highly sheared low-grade metamorphic rocks of the interior zone of the Ouachita belt are adjacent to strongly deformed and locally slightly altered foreland facies rocks.

Havoline Oil Co. 1 Weatherby is assumed to be on the northern perimeter of the axis. Sample descriptions in the Texas Bureau of Economic Geology files indicate that the pre-Cretaceous sequence is mostly dark quartzitic dolomite, probably of Lower Paleozoic foreland facies, showing varied degrees of incipient to weak metamorphism. The well is bottomed in a highly sheared metarhyolite (pale green schist) resembling the Precambrian metarhyolite exposed in the Van Horn area. The extension of incipient to weak metamorphism of the Paleozoic foreland carbonate rocks was probably caused by the advance of the Ouachita belt against the resistant Devils River uplift.

The northern axis of the uplift trends eastward approximately 21 miles where it begins to plunge northward into the Val Verde basin and eastward toward the western end of the Kerr basin; apparently, these two basins are connected by a channel forming a segment of the Ouachita geosyncline.

Fish Production Co. 1 Postell is located near the eastern end of the uplift where it begins to dip off to the north and east. According to Goldstein (1955), the sequence in this well is classified as normal foreland facies which has under-

gone local metamorphism from a nearby igneous intrusion. Farmer (1957) reported a normal section including Atoka, Marble Falls, Ellenburger, and Cambrian. Dr. Barnes (1959) identifies the Ellenburger sequence in this well as the Tanyard formation and bottoms the well in the Welge formation. It will be noted that this point was used in the preparation of the accompanying cross-section and that the section from the top of the Riley to the Precambrian was postulated. This procedure was followed because Dr. Barnes' classifications of the sequences of other wells in the area were used in this report.

At this point it should be emphasized that normal foreland facies of Paleozoic carbonate rocks, with favorable reservoir characteristics, should be present on the north and east flanks of the uplift.

As indicated by the structural map (Fig. 1), the eastern end of the uplift is closed by the flanking off of the formations into the western end of the Kerr basin and swinging southward; the strike then trends westward, forming the south flank of the uplift which is overridden by the interior zone of the Ouachita structural belt.

Magnolia Petroleum Co. 1 Wardlaw is situated on the south flank of the uplift. This well penetrated the metamorphosed rocks of the interior zone of the Ouachita structural belt and entered unaltered dolomite section (Goldstein, 1955), which is generally referred to as upper Ellenburger of normal foreland facies. This classification has been interpreted by the writer as the Honeycut member of the Ellenburger group.

The following structural history is suggested: (1) Thrusting of metamorphosed Ouachita rocks over metamorphosed Lower Paleozoic rocks of carbonate foreland facies. (2) Intrusion of gabboric rocks. The thickness of the Honeycut and Gorman formations is estimated to be of the approximate thickness as that found in the General Crude 1 Anderson drilled on the opposite side of the basin in southern Bandera County. The postulated section from the Tanyard to Precambrian is correlated with the Fish 1 Postell. Both the Tanyard and Gorman formations are wedged out between the 1 Wardlaw and 1 Postell.

The Devils River uplift plunges northward into the Val Verde basin as evidenced by Phillips Petroleum Co. 1-A Carson located in southeastern Edwards County. This well, drilled near the axis of maximum thickness of the basin, penetrated thick sequences of late Paleozoic foreland rocks encountering upper Ellenburger, interpreted by the writer as the Honeycut formation, at total depth of 9,767 ft. The section from the top of the Ellenburger to the Precambrian is postulated with some allowance made for progressive thickening.

The cross-section (Fig. 2) extends in a northeasterly direction, embracing several wells on the north side of the Val Verde and Kerr basins, and terminating at the G. L. Rowsey 2 Nowlin, drilled in southern Kerr County. This well penetrated a normal sequence of foreland Paleozoic rocks encountering the Precambrian rocks of the Llano uplift.

The absence of the frontal zone on the east and north flanks of the uplift conforms with well data in the area structural map. The northern limit of the frontal zone lies south of the Texaco Inc. 1 Mitchell located in northeastern Uvalde County; indications are that the well may be faulted but frontal zone facies were not encountered (personal interview with Dr. Flawn). According to Goldstein (1955), the well passed from the base of Cretaceous to top of Permian at 1,272 ft., entered the Pennsylvanian at 1,745 ft. and bottomed in Stanley-Jackfork at total depth of 6,503 ft. (Some electric logs show top of Ouachita facies at 1,710 ft.)

The northern limit of the frontal zone continues in a westerly direction to the vicinity of the Bernard Einstoss 1 Roswell Wardlaw located in northwestern Uvalde County. According to R. P. Maner (1959), the sequence is composed of beds which possess many characteristics suggesting that the well is either within, or very close to, the frontal zone of the structural belt.

From the Einstoss well, the front bows rather sharply southward with its western limit contained east of Phantom Oil Co. 1 Cloudt located in northwestern Uvalde County, near the county line. This well, situated on the lower northeastern flank of the Devils River uplift, penetrated foreland facies basin rocks, probably of Atokan age.

While the above well control does not accurately define the limits of the frontal zone, a pattern of its presence appears to be forming; that is, the advance of the front was deflected by the buttress-like resistance of the Precambrian Devils River uplift. The east side of the uplift, above the lower flank, would be safe from the encroachment of the frontal zone which is not considered to possess favorable tendencies.

Devils River uplift, especially the north and east flanks, present structural and depositional characteristics similar to those of the Central basin platform. As indicated by the cross-section, huge sections of foreland facies of carbonate rock formations wedge out against the flanks.

A correlation of Phillips 1-A Carson with Fish 1 Postell indicates favorable prospects for traps, including the Permian section, which is completely wedged out; lenses in the Pennsylvanian sands with possibilities of reefing in the limestone sections; both Honeycut and Gorman formations of the Ellenburger group are wedged out; and large sections of highly fossiliferous sedimentary formations of Cambrian age show considerable thinning or wedging or both. Very few wells in the entire region have penetrated the Lower Paleozoic formations.

In the writer's opinion, an overall study of the area indicates that the more favorable structural aspects exist on the east end of the Devils River uplift, inasmuch as it presents an anticlinal feature accentuating the possibilities for closure of the many lensing formations. A well located on the east flank of this structure should explore the entire Paleozoic sequence and reach the Precambrian basement at a reasonable drilling depth.

No mention has been made of Cretaceous possibilities as this report deals primarily with the Paleozoic, though producing formations in other areas of the Cretaceous are present and should not be ignored.

References

Barnes, Virgil E., "Plate I, Pre-Simpson Paleozoic Rocks," Bureau of Economic Geology of the University of Texas, Publication No. 5924, 1959.

Cloud, Preston E., Jr., and Barnes, Virgil E., "The Ellenburger Group of Central Texas," Bureau of Economic Geology of The University of Texas, Publication No. 4621, 1946.

BULLETIN: EARLY TABULATIONS SHOW NEW *FLEET-SIZE* LARK HAS WON ACCEPTANCE

'62 LARK FLEET ORDERS IN FIRST 3½ WEEKS—

State of Connecticut • Railway Express Company • Avis Rent-A-Car, Miami • Winnetka, Ill. Police Dep't. • State of Florida • Yellow Cab Co., Erie, Pa. • F. W. Means & Company • University of California • Norwalk Tire Company Northern Illinois Gas Co. • Firestone Tire & Rubber Co. • City of Cleveland, Ohio • Frenat Cab Co., New York National Cash Register • Santa Clara County, Cal. • Convair Division, General Dynamics • City of Milwaukee, Wis. American Cab Co., Kansas City • State of Minnesota

HERE ARE THE REASONS WHY THE NEW FLEET-SIZE LARKS ARE GOING PLACES IN '62

- **NEW 113" WHEELBASE,** 5 inches longer than Rambler Classic, gives luxurious ride and room . . . a bigger car than any other at the same price.
- **NEW INTERIOR DIMENSIONS** provide legroom comparable to Cadillac—over 6 inches more legroom than Plymouth, over 12 inches more than Corvair Monza!
- **NEW HEADROOM** in front is 40"—a full inch higher than the Fairlane. New headroom in back is 39½"—a full inch and a half higher than the Fairlane. (When we say "room for six-footers" we mean it.)
- **FLEET-PROVED POWER** in lively Six or choice of two V-8's—112 to 225 HP! Five body styles to choose from, with wide choice of trim, colors and options—the widest offered by any manufacturer!
- **NEW FINE-LINE STYLING,** a longer car with smart European design, wins quick acceptance with fleet-car drivers. Glamor-styled but taxi-tough!
- **GO-ANYWHERE STAMINA,** with high ground clearance—even on off-highway trails, The Lark takes the most beating with least complaint. Heavy Duty equipment is available on every model.
- **COMPACT SIZE PRICE TAG** on the Fleet-size Lark—only the first of many savings! Lowest maintenance and repair have been proved in Lark fleets across the country, for years. Endurance-built quality keeps operational costs low...keeps trade-in value right up among the top few makes!

new **'62 LARK** *BY STUDEBAKER*

GET THIS VALUABLE INFORMATION RIGHT NOW!
Send me all the data on the '62 Fleet-size LARK.

Name_____

Title_____

Company_____

Address_____

OG-11-62-2

City_____ Zone_____ State_____

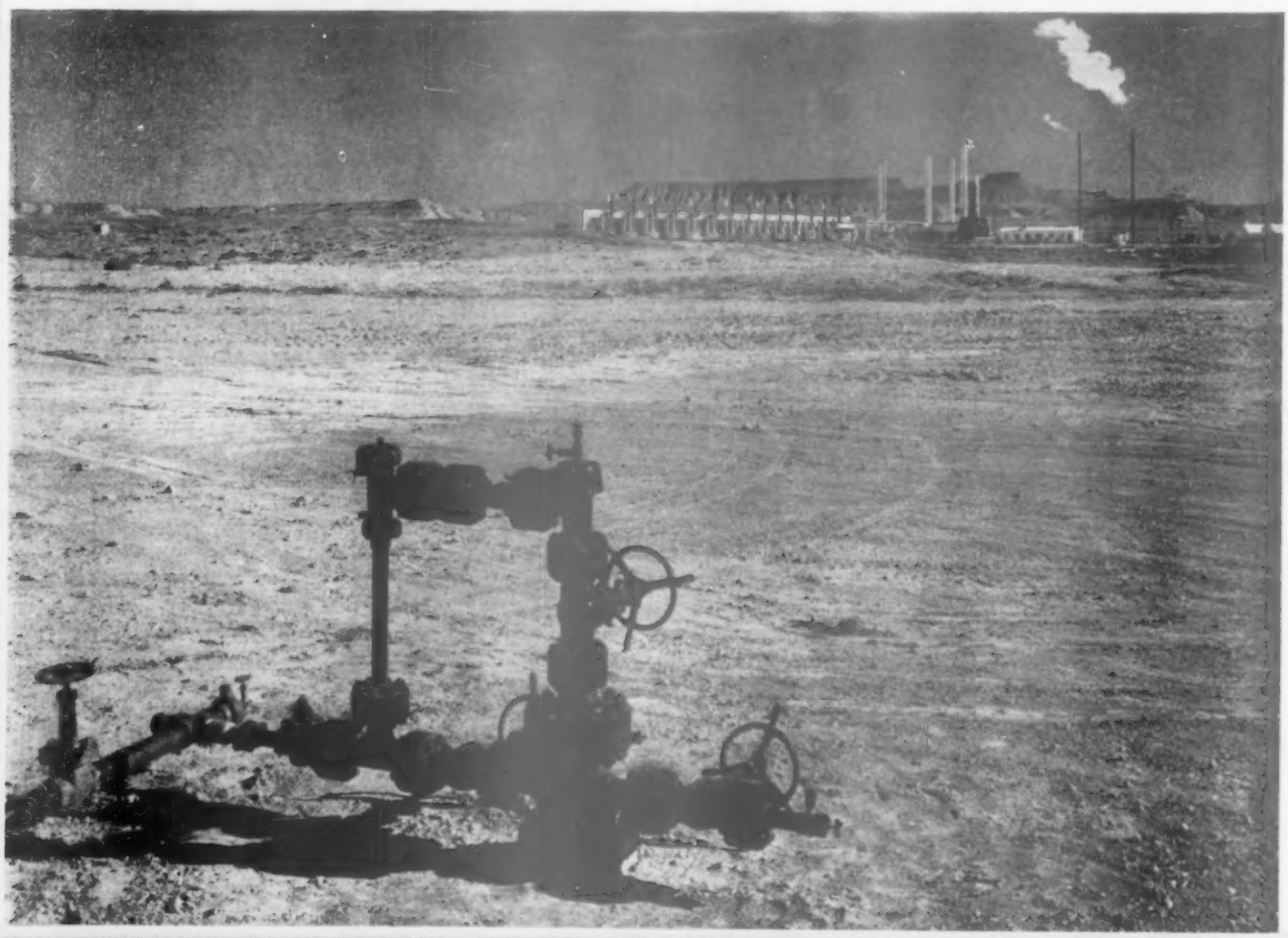
Mail to: A. E. Fitzpatrick, Studebaker Fleet Department, South Bend, Indiana.

PRODUCTION will be limited in Patrick Draw field by market for tail gas from the plants, rather than by capacity. Market last summer was about 15 M.M.c.f.d. This gathering line runs to the Union Pacific plant at the field.

Young

SWEETWATER COUNTY'S comparatively new Patrick Draw field is third in Wyoming production—behind Elk Basin and Hamilton Dome. Since its discovery in 1959 at El Paso 1 Patrick Draw unit in 1-18n-99w, the field has grown into one of the most active new areas in the Rockies. The rapid growth and success of Patrick Draw field and its neighboring producers at Desert Springs, West Desert Springs, Playa, Arch, Sand Butte, and Tablerock has made the Green River basin a busy Rocky Mountain exploratory arena.

NEAR THE CENTER OF PATRICK DRAW FIELD, Union Pacific Railroad Co.'s new 27 M.M.c.f. processing plant is now in operation. Colorado Oil & Gas Co. recently started up at its natural-gas-processing plant in the same area, handling about 4 M.M.c.f.d. Ultimate capacity of the Colorado plant is reported at 10 M.M.c.f.d. Both plants are three-product, refrigeration-absorption-type units. Texaco Inc. producer in Patrick Draw field lies in the foreground.



Wyoming field is third-largest

The first major oil field in one of the Rockies' leading gas basins jumps into third place in Wyoming production. Since discovery, 134 oil wells have been completed.

CURRENT FIELD DATA ON WYOMING'S THIRD BIGGEST OIL PRODUCER—PATRICK DRAW

No. of producing wells: 134.
Producing sand: Upper Cretaceous Almond, 4,900-5,300 ft.
Proved acreage: 12,500.
Daily average production: 25,000 bbl.
Cumulative production through April: 6,500,000 bbl. plus.

Data on Sweetwater County (Patrick Draw included) area
Completions this year: 51 oil-field wells, 7 gas-field wells, 6 new gas discoveries.
Active operations: 18.

(Staff photos by Carl Hoot)

A SPRECHEN DRILLING CO. CREW at work at Pubco Petroleum Co.'s 9-25J well in C NW SE 25-20n-99w, Sweetwater County, Wyoming. This Ericson test was spudded 9-30-61. It is currently drilling below 4,645 ft. It is located on the Playa unit, north of Patrick Draw field.

MODERN DRILLING EQUIPMENT includes desanding unit. This unit is at the Rig No. 5, Sprechen Drilling Co.

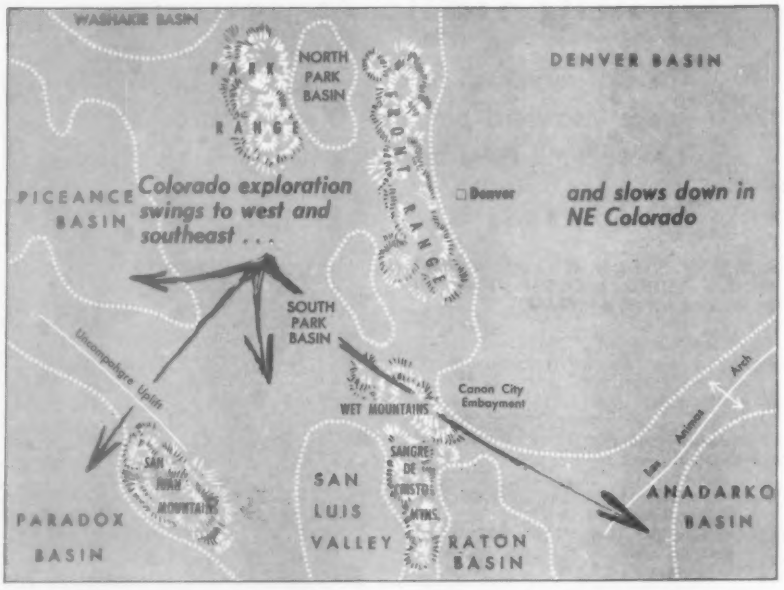
THIS TRAVELING coating and wrapping machine crew is working on El Paso's new 6-in. gathering line at Patrick Draw.

Colorado shows hike in drilling

AS THE 1961 drilling year nears its final weeks, Colorado is one of the eight states in the U. S. showing a slight increase over 1960 totals. Wildcatting is down slightly from last year, but development drilling is a bit higher.

Definite trends shaping. Most of Colorado's drilling these days is in areas outside the Denver basin. It was in that northeastern corner of the state where most new fields and most development took place in past years. But now the big attraction is the western basins and the southeastern corner of the state in the Anadarko basin.

Western Colorado's success as a new oil and gas province has climbed steadily since completion of the Pacific Northwest Pipeline several years ago. New discoveries, mostly gas, have popped up throughout the western reaches of the state in both the Piceance Creek and Paradox basins. Particularly busy counties are Rio Blanco, Moffat, Mesa, Garfield, Montezuma, and San Miguel. First production was opened in the Wolf Creek country earlier this year. New work has been announced for this area high up in the Rocky Mountains.



NEW CORNERS OF COLORADO beckon the oil and gas hunters these days, shoving the Denver basin aside as a prime exploratory objective.

Colorado completions this year

Total	Oil	Cond.	Gas	Dry	Footage
575	82	2	102	389	2,603,729

Wildcat completions this year

Total	Oil	Cond.	Gas	Dry	Footage
256	9	1	19	227	1,242,810

Geological Distribution of 1961 Colorado discoveries

Denver basin	10
Anadarko basin	5
Paradox basin	3
Piceance basin	10
White River basin	1

Current active tests by basins

Denver	19
Anadarko	4
Paradox	16
Piceance	33
North Park	2
White River	1

One of the most active areas in western Colorado has been at Divide Creek unit in Mesa County. This 1956 discovery by Gordon Hurd in SW NW 36-8s-91w caused a continual exploratory swing through Garfield, Mesa, and Pitkin counties in the past several months. The discovery well in 1956 flowed 5,210 M.c.f.d. from Mesaverde Cretaceous perforations at 3,874-3,933 ft. Flow was on a 29/64-in. choke. The discovery well at Divide Creek was drilled originally in 1937 by Continental Oil Co. who didn't test the pay found by Hurd in later years. There are now more than a dozen gas wells in the field. Sun Oil Co. developed the field, extending it across the Garfield-Mesa County line along a 6-mile trend from NE SE 4-8s-91w to 9s-91w. The width of the producing area of

KelCo Heavy Duty—Spinning Line

CATHEADS

Speed up your trips and reduce accident hazards. Anti-fouling spool. Standard replaceable bearings. Special design keeps clutch pressure plate parallel at all times. For SAFETY, specify KelCo catheads.

Catheads
Power Slips
Tubing Tongs

BE SAFETY WISE KELCO KELCO-DAL

BEN F. KELLEY CO., INC.
18 South Madison
TULSA, OKLAHOMA

Available Through Your Preferred Supply Store

Write For Free Catalog and Price List

the field is now about 3 miles. Divide Creek's producing limits are not defined as yet.

Pitkin County deep in the mountain country is now a producer as a result of the success at Divide Creek. Utex Exploration Co. opened Mesaverde gas production at Wolf Creek at the 1 Cal in NE NW 26-8s-90w. This Cozette Mesaverde well flowed 3,380 M.c.f.d. from perforations at 4,658-4,786 ft. A 2-mile northeastern extension at 2 Government was later abandoned by California Co. The 3 Unit is now busy in NW NE 34-8s-90w.

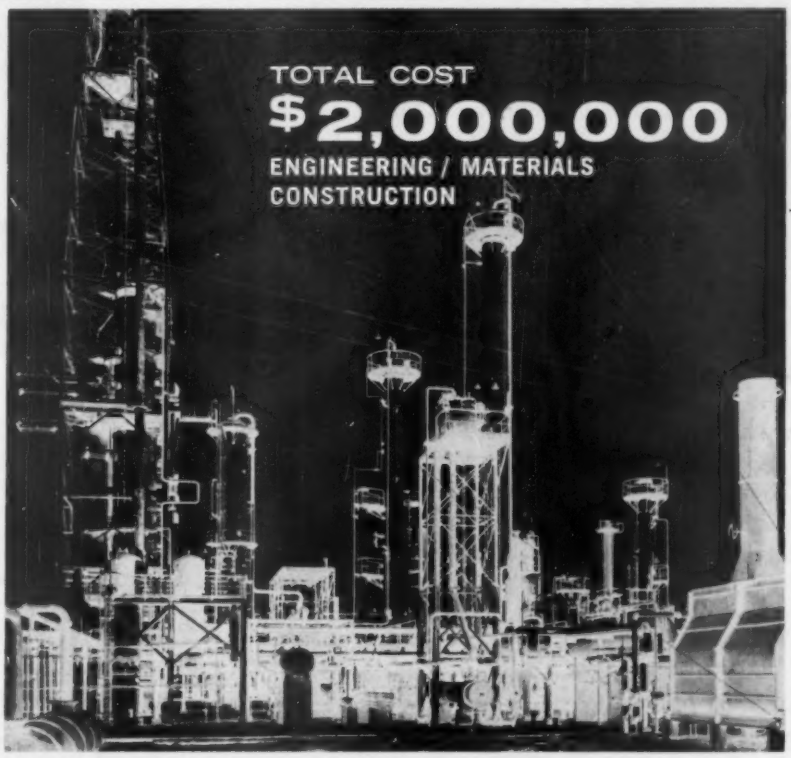
An important discovery in 1959 at Mountain States Drilling Co. 1 Boulton, NE NE 22-7s-91w, opened a Mesaverde gas area 4 miles north of Divide Creek. That well flowed 850 M.c.f.d. from perforations at 7,526 to 7,886 ft. This discovery leaves an undrilled area to the north and between Divide Creek and Wolf Creek. There is also an undrilled area 5 miles from Divide Creek northwest. Mountain States Drilling Co. et al. 1 Starbuck in C NW NW 25-7s-92w flowed 500 M.c.f.d. from Mesaverde at 2,960 ft. to create this gap.

Two important Mesaverde discoveries were completed to the west in Garfield County this year. Southern Union Production Co. 1 Gross-Hahnewald in SE NE 8-7s-94w flowed 1,411 M.c.f.d. from perforations at 6,180-7,394 ft. and the 29-95 Government in NW SE 29-7s-95w flowed 1,800 M.c.f.d. from open hole at 4,880-6,509 ft.

Important western fields opened since 1959 are: Baldy Creek, Garfield County, gas production in 17-7s-90w; Big Gulch, Moffat County, gas production in 16-7n-93w; Buzzard Creek, Mesa County, gas production in 12-9s-93w; Cathedral, Rio Blanco County, gas production in 20-3s-100w; Desert Canyon, Montezuma County, gas in 11-34n (N of Ute) 20w; Dragon Trail, Rio Blanco County, gas in 30-2s-102w; Egnar, San Miguel, gas in 30-44n-19w; Fawn Creek, Rio Blanco County, gas in 22-3s-98w; Flodine Park, Montezuma County, oil in 15-35n-20w; Goodman Point, Montezuma County, gas in 6-36n-18w; Southeast Lisbon, San Miguel County, gas in 5-44n-19w; Lower Horse Draw, Rio Blanco County, gas in 15-2s-103w; Missouri Creek, Rio Blanco County, gas in 28-3s-103w; Shire Gulch, Mesa County, gas in 6-10s-96w; Towaoc, Montezuma County, oil in 21-33½n-20w; Whiskey Gulch, Rio Blanco County, gas in 13-4s-98w; and Wolf Creek, Pitkin County, gas in 26-8s-90w.

The Denver slowdown. Although 10 new fields have been opened in the big Denver basin in northeastern Colorado, over-all activity continues to drop, a trend that has been shaping up for several years. Most of this basin's noise has been in Nebraska in the past couple of years. Now with the big play in southern Nebraska's Cambridge arch country, even the Denver basin portion of that state has seen a decline in activity.

Most of eastern Colorado exploration and development news has been in the extreme southeast corner, particularly Baca County. There have been five oil and gas discoveries in this section this year. Development in and around Midway and Flank fields in Baca County is brisk and new drilling records are in store for the southeast corner of Colorado. Targets here have been the Topeka and



3000 BPD Catalytic Cracking. Gas Concentration. 800 BPD Propylene & Butylene HF Alkylation.

This recently completed revamp converted a plant producing low value, poor octane gasoline and fuel oils into a plant producing no fuel oil and a 20% overall higher yield of marketable gasoline . . . giving this refinery the highest quality gasoline sold in its marketing area. The total cost . . . $2,000,000.00 including engineering, materials and construction. Surprised? Not Litwin . . . . . because this is our specialty!!! LET US DO THE SAME FOR YOU!

Litwin ENGINEERING COMPANY
204 N. WACO / WICHITA, KANSAS
Representatives in Canada, Europe, Middle East & South America

121,000 gallons of hydrochloric acid couldn't chew up

Devonian Well Service of Odessa, Texas, put a new USS Tiger Brand PETROFIBER Core swabbing line into service in April, 1960. It was used intermittently and stored for a period of 11 months. Then came the big job. The unit that works this line was set over a 17,300-foot well in Pecos County, Texas, where it had to swab continuously for four weeks through 3½" drill pipe.

During this time, it went down to 13,500 feet and handled—

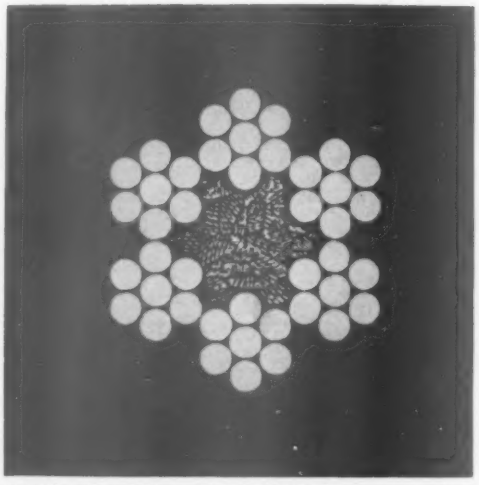
- **121,000 gallons of 15% hydrochloric acid, all preheated to 180°F., pumped into the formation and then swabbed back immediately. Bottom-hole temperature was 280°F.**
- **145,000 gallons of gelled water and 80,000 pounds of frac sand.**

This combination of preheated acid and swabbing back frac sand added up to about the most corrosive conditions to which a swabbing line core ever could be exposed. There was also a very heavy tensile loading upon the line.

A close inspection of the rope after this 12-month workout showed that the entire swabbing line was in good condition. The PETROFIBER Core, in particular, showed no signs of acid attack and was still offering good support for the strands. A breaking test performed on a sample from the rope showed that it still had 92% of its catalog strength.

Dick McManigle, owner of Devonian Well Service, says, "Only a PETROFIBER Core line could take such a workout."

Order PETROFIBER lines from your distributor or write American Steel and Wire, Dept. 1464, Rockefeller Building, Cleveland 13, Ohio. USS, Tiger Brand and PETROFIBER are registered trademarks.



USS Tiger Brand Lines with PETROFIBER Cores are made in standard constructions, 6 x 7 and 6 x 19 in all sizes.

PETROFIBER line core broomed out shows appearance of core before being put into service.

Advantages of Tiger Brand lines with PETROFIBER Cores

100% resistance to all hole fluids
A more stable line throughout its life
Withstands temperatures ranging from —80°F. to 300°F.
Long life and lower wire rope costs

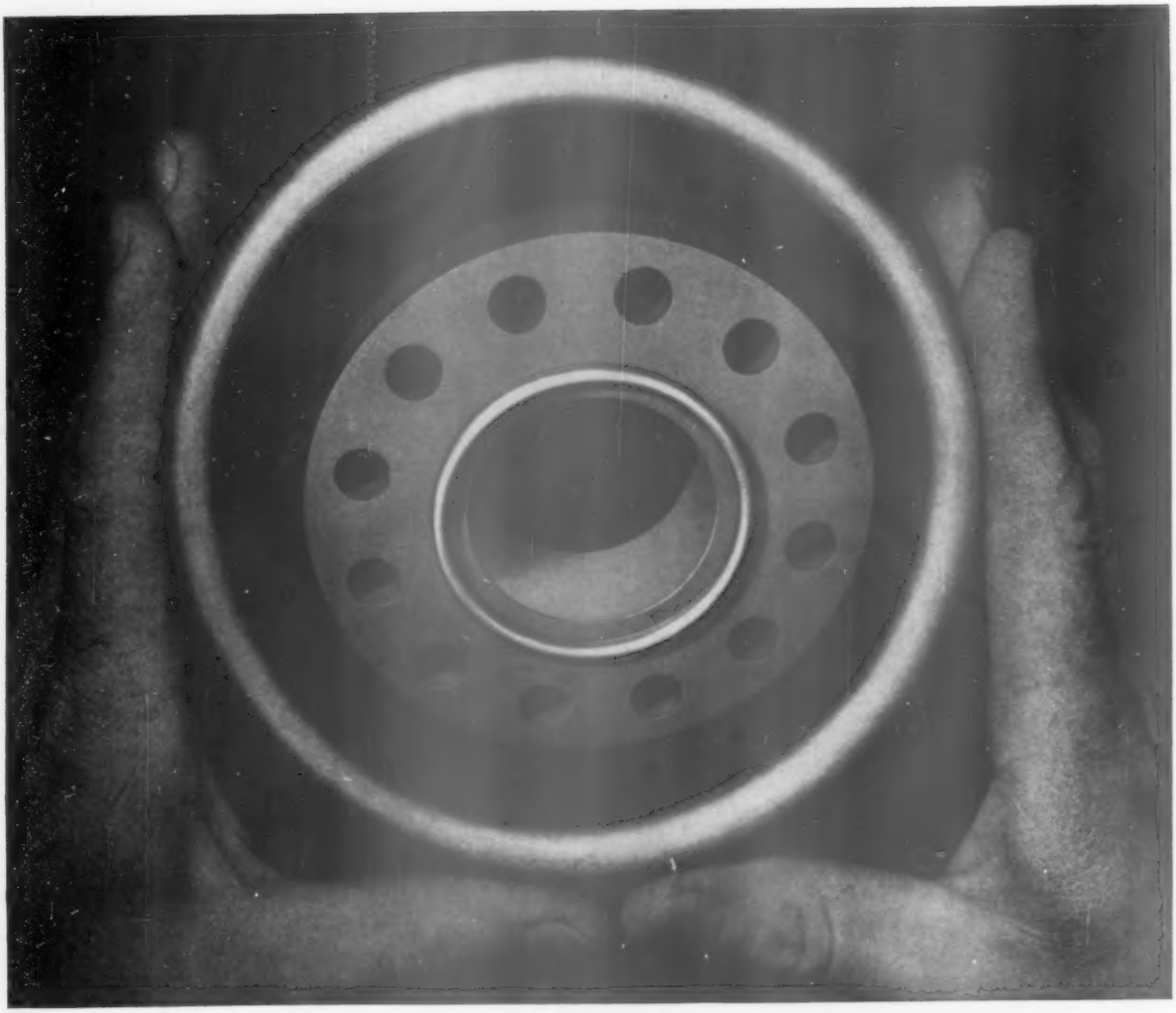
American Steel and Wire
Division of
United States Steel

Columbia-Geneva Steel Division, San Francisco, Pacific Coast Distributors
United States Steel Export Company, Distributors Abroad

this PETROFIBER Core Line

Condition of $^{9}/_{16}$" 6x7 PETROFIBER Core line after a year of work in deep wells is checked by Dick McManigle, Jr. and Pat Patton of Devonian Well Service and Bill Campbell, American Steel and Wire sales representative in West Texas.

This mark tells you a product is made of modern, dependable Steel.



INSTALL J-M V-TITE® GASKETS

Right to start with...right to stay with

IF YOU ARE CONCERNED with the design or maintenance of ring-type joints, it will pay you to insist on the tighter, more efficient and longer-lasting seal you get with J-M's V-Tite design.

If it's your job to keep this equipment operating at top efficiency, here's a good point to remember: the gaskets that are right to *start* with . . . are right to *stay* with.

V-Tite Gaskets are "right" because every step in their manufacture is meticulously performed. Close tolerances are rigidly maintained for matching of rings with flange grooves. Carefully-controlled annealing keeps gasket hardness well below flange hardness . . . to assure proper flow and sealing without damaging the flange surfaces. Contact surfaces are smoothly finished . . . with no ridges, no tool or chatter marks that cause joint leakage.

J-M produces a wide selection of custom-designed and standard gaskets in any material, dimension or cross-section you require . . . including the new pressure-actuated BX Ring Gasket for extreme pressure service up to 15,000 psi at temperatures up to 250 F.

Complete information from your J-M Distributor. Or write to Johns-Manville, Box 359, New York 16, N.Y. In Canada: Port Credit, Ontario.

V-Tite Gaskets meet API specifications

JOHNS-MANVILLE

JOHNS-MANVILLE JM PRODUCTS

Morrow sands of Pennsylvanian age. The discoveries appear to be a large extension of giant Greenwood gas field of southwestern Kansas. This area, which lies between the Denver and Anadarko basins, has never had a worthy exploration program until lately. There has been scattered success on the Las Animas arch since 1952, but it wasn't until last year that southeastern Colorado took on a new wildcat look.

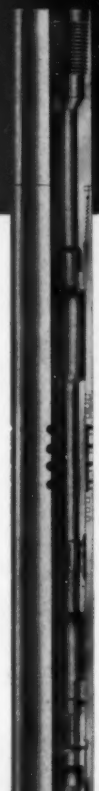
Colorado discoveries this year

(new pools only)

1. Mesa County, Asbury Creek area:
   Frontier Refining Co. 1 Christiana-Government, SW SE 9-9s-101w. IPF 4,653 M.c.f.d., CP 815 psi., TP 805 psi., shut in. Buckhorn Mississippian open hole 2,597-2,603 ft. TD 2,603 ft. Buckhorn discovery, new field.
2. Baca County:
   Horizon Oil & Gas Co. 1-12 Trahern, C NW SE 12-32s-43w. IPF 2,600 M.c.f.d., Topeka Pennsylvanian 3,205-20 ft. TD 3,250 ft. Topeka discovery, new field.
3. Montezuma County, Lebanon unit:
   California Co. 1 Unit, SW SW 20-38n-15w. IPF 450 M.c.f.d., open 2-in. tubing, Cutler Permian, 3,200-14 ft. TD 7,930 ft. Cutler discovery, new field.
4. Morgan County:
   Forest Oil Corp., 22-2 Dunne, C SW SE 22-4n-58w. IPF 480 BOPD, ½-in. choke, D Cretaceous sand 5,764-75 ft. TD 5,871 ft. "D" sand discovery, new Denver basin field.
5. Logan County:
   Tipps Drilling Co. 1 Sindt, C SW NW 15-11n-53w. IPP 17 BOPD and 45% water, "J" sand Cretaceous 5,467-73 ft. TD 5,541 ft. "J" sand discovery, new field.
6. San Miguel County, Egnar unit:
   Belco Petroleum Co. 1 Unit, C SE NE 30-44n-19w. IPF 11,700 M.c.f.d., open flow, shut in. Mississippian 9,116-9,296 ft. TD 9,642 ft. Mississippian discovery, new field in Paradox basin.
7. Weld County:
   DeVaughn Oil & Gas Co. 1 Thomas, OWQO. OTD 6,570 ft. SE SW 31-7n-58w. IPF 24 BOPD, 200 M.c.f.d., cut 2% b.s. and w. "D" sand 6,459-63 ft. TD 6,570 ft. "D" sand discovery, new field in Denver basin.
8. Washington County:
   Plains Exploration Co. 1 Challis Farms Inc., C NE NW 31-1n-53w. IPP 26½ BOPD, 70% b.s. and w., "D" sand 4,886-92 ft. TD 5,451 ft. "D" sand discovery, new Denver basin field.
9. Logan County:
   A. T. Skaer 1 Carey, OWDD, OTD 5,155 ft. SW NW 26-9n-53w. IPF 1,449 M.c.f.d., and 6 bbl. cond. per day, 21/64-in. choke. "J" sand 4,905-9 ft. TD 5,155 ft. "J" sand discovery, new Denver basin field.
10. Baca County:
    Horizon Oil & Gas Co. 1-10 Lepel, C NE NE 10-32s-44w. IPCAOF 2,225 M.c.f.d., SITP 7 days 427 psi., lower Topeka Pennsylvanian 3,324-32 ft. TD 5,661 ft. Lower Topeka discovery, new northwestern Anadarko basin field.
11. Baca County:
    Keith L. Rising et al. 1 Burchfield, C NE SW 4-32s-43w. IPF 2,500 M.c.f.d., Topeka 3,245-58 ft. TD 3,450 ft. Topeka discovery, new northwestern Anadarko basin field.
12. Washington County:
    Kimbark Exploration Co. 2 Kalous, OWDD, OTD 5,318 ft. C NE SW 29-2s-56w. IPP 63 BO plus 75% water per day, "J" sand 5,189-90 ft. TD 5,335 ft. "J" sand discovery, new Denver basin field.
13. Washington County:
    Union Texas Natural Gas Co. 1 Jones, C NW SE 26-3s-51w. IPP 166 BOPD, cut 12% water, "J" sand 3,938-44 ft. TD 4,042 ft. "J" sand discovery, new Denver basin field.
14. Pitkin County, Wolf Creek Pass unit:
    Utex Exploration Co. 1 Cal, NE NW 26-8s-90w. IPF 3,380 M.c.f.d., 2-in. tubing, Cozette discovery, 4,658-4,786 ft. TD 5,165 ft. Cozette Cretaceous discovery, new field. First in county.
15. Washington County:
    Tipps Drilling Co. 1 Downing, C SW NE 20-3s-53w. IPP 50 BO, 60 BWPD, "J" sand discovery, new Denver basin field.
16. Garfield County:
    Southern Union Gas Co. 1 Gross-Hahnewald, SE NE 8-7s-94w. IPF 1,411 M.c.f.d., 2-in. line, back press. 600 psi. SITP 1,784 psi. Mesaverde Cretaceous 6,180-7,394 ft. TD 7,560 ft. Mesaverde discovery, new field.
17. Logan County:
    Pfeifer Oil & Gas Co. 1 Budin, OWWO OTD 5,369 ft. C SW NE 12-8n-55w. IPP 148 BOPD, cut 10% water, "J" sand 5,318-20 ft. TD 5,369 ft. "J" sand discovery, new Denver basin field.

AXELSON-GARRETT

TYPE "C"
CIRCULATING
VALVE



Full Circulating Capacity!

Unmatched for reliability, the Axelson-Garrett Type "C" Circulating Valve has now been further improved to offer all of these exclusive features: Perfect Sealing — Full Circulating Capacity — Repeatable Shifting — Positive Locating — Slim Dimensions.

Designed primarily for the displacement of well fluids, Type "C" valves may be used on permanent type completions, for selective production or for well remedial work.

When installed, the large ports in the mandrel and large annular space between sleeve and mandrel assure full capacity. The unique design and compact seals have made possible this full capacity in a valve with minimum O.D. Its characteristics make it an ideal tool for use in critical diameter parallel string completions.

When opening or closing the valve, the shifting tool automatically seats into the proper shifting position. When shifted the internal profile of the valve changes. The shifting tool can be moved only if the valve has been fully shifted, giving the operator a positive check on the position of the sleeve.

A new Brochure (#CVC) is now available showing the many services that can be performed by this valve. Illustrations include shifting and checking the valve when opening or closing. Write for your copy today, or check with your Axelson-Garrett man.

USI Axelson-Garrett
DIVISION OF U.S. INDUSTRIES, INC.
"Products Designed to Give Oil a Lift" General Offices: Longview, Texas

Western Australia feels bit again

EXPLORATORY MEN and seismic crews have returned to Western Australia after several months of quiet, according to Petroleum Gazette.

WAPET and its partners, Texaco Overseas, California Asiatic, Shell Development, and Ampol Exploration, spudded in a deep hole at Eneabba, 160 miles north of Perth last June. In August, this well was drilling below 8,730 ft. The company has also completed a geological survey of about 10,000 sq. miles in the Canning basin by use of a helicopter. They also began a marine survey in Exmouth Gulf.

Hunt Oil Co. has carried out an aerial magnetometer survey of its permit area northeast of Kalgoorlie.

The Bureau of Mineral Resources is using two helicopters to conduct gravity surveys over parts of the Amadeus, Georgina, and Great Artesian basins. This vast area covers parts of Northern Territory, South Australia, and western Queensland.

Union Oil Co. and Kern County Land Co. have sealed the 1 Cabawin oil discovery in Queensland. This well, in which Australian Oil and Gas, Ltd., has a 20% interest, was producing light oil at the daily rate of 57 bbl. and 491 M.c.f.d. The companies involved are now going to drill 4 miles east at East Cabawin 1. This one will go to 12,000 ft.

Quilpie. Phillips Petroleum Co. and Sunray Mid-Continent hit basement at this wildcat. They are to drill another wildcat a few miles away. Santos and Delhi are going to work again in the Innamincka area. They drilled two dry holes on Mornington Island, one to 2,764 ft. and the other 3,000 ft.

Combarngo. The Associated Group, drillers of 1 Combarngo, found basement at 5,985 ft. There were some oil and gas shows at this wildcat.

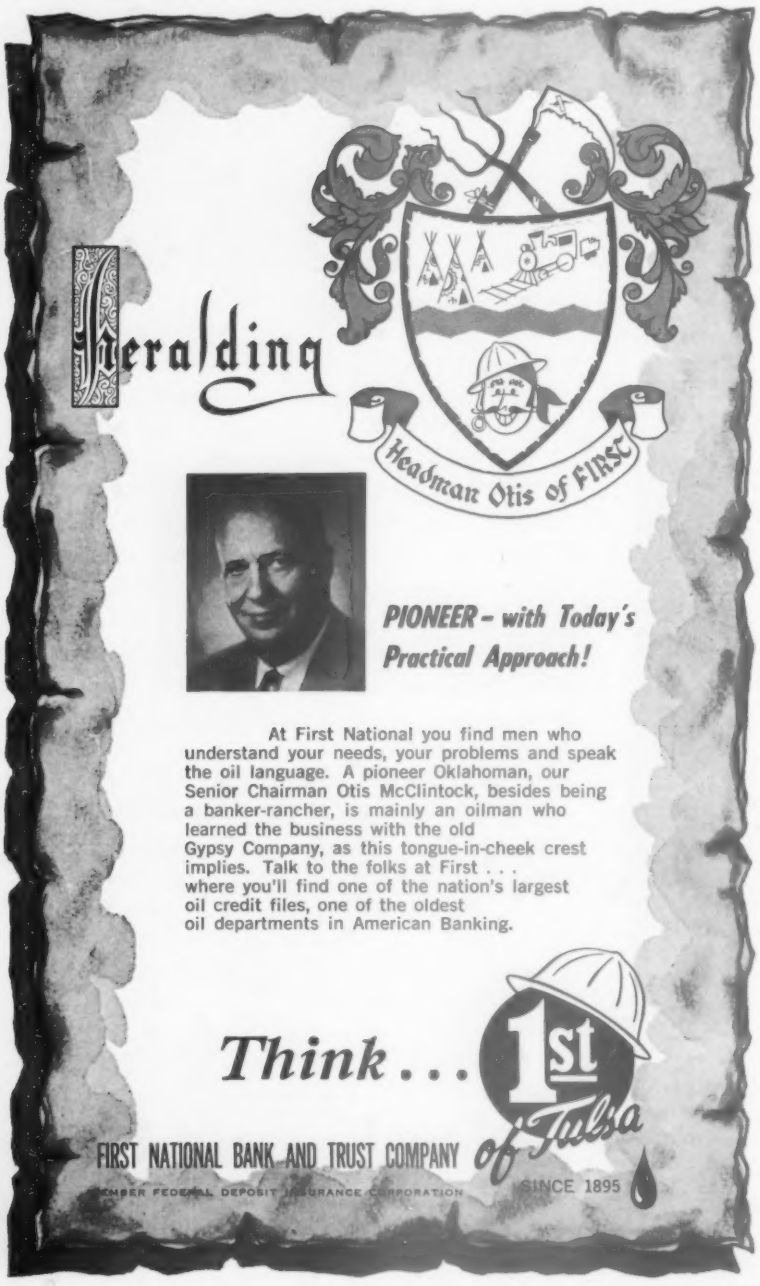
Oil Development completed a seismic survey in its Central Queensland area in July. Reports state the company had good results, but completed evaluation is still not ready. The company spudded a strat test slated for 2,000 ft. on Bathurst Island off Darwin. Oil Development, along with Santos, has bought two rigs for future operations.

Victoria. Frome-Broken Hill was nearing 11,000 ft. in August at 1 Flaxman, 9 miles west of Port Campbell in Victoria. Some gas shows were reported at this wildcat.

Wildcat taps oil near Canada's Jasper Park

A remote oil discovery is reported at Cabin Creek 200 miles west of Edmonton, just north of Jasper National Park. The wildcat is Dome Petroleum, Ltd., et al. 6-9 Cabin Creek, LSD 6, 9-55-3w6.

The new find was made in the Lower Cretaceous at the 2,300-ft. mark. Berland River gas field lies 45 miles northeast of Cabin Creek. The closest previous drilling is 16 miles southeast. Shell Oil Co. is drilling a 15,000-ft. wildcat 17½


Heralding
Headman Otis of FIRST
PIONEER – with Today's Practical Approach!
At First National you find men who understand your needs, your problems and speak the oil language. A pioneer Oklahoman, our Senior Chairman Otis McClintock, besides being a banker-rancher, is mainly an oilman who learned the business with the old Gypsy Company, as this tongue-in-cheek crest implies. Talk to the folks at First . . . where you'll find one of the nation's largest oil credit files, one of the oldest oil departments in American Banking.
Think . . . 1st of Tulsa
FIRST NATIONAL BANK AND TRUST COMPANY
MEMBER FEDERAL DEPOSIT INSURANCE CORPORATION
SINCE 1895

miles northwest of the Dome discovery. This new discovery was a surprise to Canadian drillers because of its shallow production in deep-drilling country. Its location in the Foothills belt where nearly all drilling has been deep should turn a few eyes to the shallow potential here.

Deep Sooner well may be producer

Ultradeep exploration in Oklahoma's Anadarko basin has turned up a possible producer in Chitwood field, Grady County.

Mobil Oil Co. 1 Craddock, C NE NW 33-5n-6w, topped First Bromide Ordovician at 16,086 ft. A test at 16,086-16,270 ft. got 5,079 M.c.f.d. with 3 bbl. condensate per hour. Mobil is coring deeper.

In Comanche County, Continental Oil Co. took final production test at 1 Wilkinson in SW NE NW 20-3n-9w, extending Southeast Sterling field westward.

The well flowed 2,600 M.c.f.d., calculated open flow, from perforations in the Wade sand at 7,258-72 ft. Wade is Pennsylvanian in age.

Big triple completion completed in Oklahoma

A big triple producer is reported in Middle Centrahoma field, Coal County, Southwest Oklahoma. The well is Tenneco Oil Co. 1 Mayer-A, S½ SE NW 1-1n-9e.

This well flowed 2,300 M.c.f.d. from perforations in upper McLish Ordovician sand at 7,732-37, 7,758-65, and 7,777-84 ft. on 12/64-in. choke. Open flow calculation was 23 M.M.c.f.d. and 10 bbl. condensate per million. Shut in pressure was 3,104 psi. From basal McLish sand perforations at 7,947-52 ft., flow was 2,900 M.c.f.d. on 12/64-in. choke with 3,116 psi. flow pressure. Open flow was 59 M.M.c.f.d. with 10 bbl. condensate per million, shut-in pressure 3,225 psi. From Oil Creek Ordovician sand at 8,222-27 ft., flow was 3 M.M.c.f.d. through 12/64-in. choke with 3,128 psi. flow pressure. Open flow was 32 M.M.c.f.d. and 3.2 bbl. condensate per million. Shut-in pressure was 3,305 psi.

Tenneco has now staked the 1 Johnston in W½ SW SW 6-1n-10e. This well will go to 8,500 ft. to test the McLish and Oil Creek sands. It is a northwest offset to the Southeast Centrahoma discovery and ½ mile southeast of the discovery well of Middle Centrahoma field.

Mobil Oil Co. will drill a 13,500-ft. wildcat at 1 Veazey in C NW 28-7n-27e, extreme eastern Oklahoma, seeking production in Spiro Pennsylvanian. It lies 8 miles east of Poteau and Poteau-Gilmore gas field.

Oklahoma's Kingfisher keeps fast pace

With new reserve estimates out at 500,000,000 bbl., Oklahoma's Kingfisher County play continues to blossom.

Harper Oil Co. dually completed 1 Edwin Vadder in C NE NE 22-18n-5w, West Columbia field, flowing 58 bbl. of oil per day on ½-in. tubing choke from open hole in the Meramec at 6,273-6,370 ft. From Oswego perforations at 5,994-6,010 ft. the well made 55 bbl. of oil per day through casing.

Don't Let
"COUPLING ITIS"
ROB YOUR MACHINES
of CONTINUOUS
PEAK PERFORMANCE
. . . Specify THOMAS FLEXIBLE COUPLINGS
Like a THIEF in the NIGHT an inferior coupling causes wear and damage to your machines—resulting in high maintenance costs and costly shut-downs.
Troublesome maintenance problems and down time are eliminated when you specify Thomas "All-Metal" Flexible Couplings to protect your equipment and extend the life of your machines.
UNDER LOAD and MISALIGNMENT only THOMAS FLEXIBLE COUPLINGS offer all these advantages:
• Freedom from Backlash
• Torsional Rigidity • Free End Float
• Smooth Continuous Drive with Constant Rotational Velocity
• Visual Inspection while in Operation
• Original Balance for Life
• Unaffected by High or Low Temperatures
• No Lubrication • No Wearing Parts
• No Maintenance
FLOATING SHAFT
DOUBLE FLEXING
SINGLE FLEXING
THOMAS FLEXIBLE COUPLINGS
Write for Our New Engineering Catalog 60
THOMAS FLEXIBLE COUPLING COMPANY
WARREN, PENNSYLVANIA, U.S.A.

Sunray Mid - Continent Oil Co. has finished at one of three zones at 1 Moore in C SW SW 8-19n-6w, East Hennessey field. The Meramec made 332 bbl. of oil in 10 hours through open hole on 22/64-in. choke. Manning and Skinner pays are shut in.

United Producing Co. 1 C. M. Doerr, C SW NW 31-19n-6w, East Hennessey field, flowed 389 bbl. of oil per day on 18/64-in. choke from Manning perforations at 6,819-47 ft. From Meramec open hole at 7,044-7,141 ft. the well made 37 bbl. per day on 20/64-in. choke.

Eason Oil Co. 1 Marshall, C SW NE 28-19n-6w, flowed 184 bbl. in 24 hours on ¼-in. choke from Manning pay at 6,674-6,704 ft.

King-Stevenson Gas & Oil Co. has a second well at Northwest Dover field at 1 Wiley unit, C SW NE 19-18n-7w. The new well, a workover, flowed 4,550 M.c.f.d. from Manning at 7,299-7,302, 7,308-12, and 7,315-20 ft.

Humble Oil & Refining Co. 2 Stribel in C NE SE 4-18n-7w, North Dover field's west side, flowed 126 bbl. of oil in 4 hours through 24/64-in. choke, or 756 per day. Production is from perforations in the Manning at 6,996-7,044 ft. Union Texas Natural Gas Co. 1 Reiswig, C SW NE 12-18n-7w, flowed 385 bbl. of oil per day on ½-in. choke from Manning at 6,875-6,925 ft.

Continental Oil Co. dually completed the 1 Hobbs in C SE SE 22-19n-7w, Southwest Hennessey field, flowing 860 bbl. of oil per day on 20/64-in. choke from Meramec open hole at 7,046-7,135 ft. From Manning, the well made 456 bbl. per day on 18/64-in. choke from 6,815-29 ft.

TC

OIL & GAS FINANCING

Texas Capital Corporation, the Southwest's *profit-prone* small business investment company, has made financial commitments of over $1,600,000 to concerns engaged in various phases of the Oil and Gas industry.

Texas Capital has a continued and growing interest in Oil and Gas financing.

For further information write:

TEXAS CAPITAL CORPORATION

A Federal licensee under the Small Business Investment Act of 1958.

Grogan Lord, *president*

P. O. Box 78 • Georgetown, Texas

Simpson oil discovery completed in Kansas

New Simpson Ordovician oil production is reported at a wildcat 6 miles southwest of Lyons in Rice County, Kansas. The discovery well is Thunderbird Drilling Inc. 1 Faler in SE NW NE 2-21s-9w, 2 miles south of Tobias field.

Production was 76 bbl. of oil per day on state test from perforations at 3,322-37 ft. A confirmation is already drilling at Lee Phillips Oil Co. 1 Schafer, NW NE SE 2-21s-9e, Pratt County. Continental Oil Co. 1 Brehm is a new Arbuckle Cambro-Ordovician discovery well in SW SE SW 23-28s-13w, 3 miles south of Pratt.

The well made 205 bbl. of oil daily from perforations at 4,422-33 ft. Flow was on 18/64-in. choke. A second location has been staked at 2 Brehm in SW SW SW 23-28s-13w.

SW Kansas drillers keep hitting

EXPLORATORY SUCCESS continues to roll on in Southwest Kansas. New discoveries are reported in Hodgeman and Morton County.

Sunray Mid-Continent Oil Co. completed 1 Miller Estate in C SW NE 8-22s-22w, 4½ miles south of Wieland field and 7½ miles northeast of Jetmore in Hodgeman County as the opener of Hanston field.

The well pumped 198 bbl. of oil

per day from perforations in the Mississippian at 4,486-92 and 4,511-13 ft.

Morton County. Thomas & Brewer completed 1 U. S. Government in C NW 15-33s-41w, Morton County, as a new pay for Berryman Wabaunsee field. The well flowed 1,530 M.c.f.d. from Morrow Pennsylvanian at 5,280-84 ft. From Krider and Winfield Permian perforations at 2,222-61 ft., the well flowed 3,154 M.c.f.d.

Seward County. Pan American completed 1 Hille Gas Unit in C NW SE 3-32s-33w, 17 miles north of Liberal, as a Chester oil well for 95 bbl. per day. The Chester Mississippian was perforated at 5,813-15 ft. Location is 7 miles south of Hopkins field.

Cities Service Petroleum Co. completed 1 Skinner "C" in C SW NE 16-34s-35w, 5 miles southeast of Walkemeyer field and 11½ miles southeast of Hugoton, flowing 2,150 M.c.f.d. from perforations in the Chester at 6,180-6,259 ft.

In Southern Rush County, 1 mile north of the Pawnee County line, Mull Drilling Co. et al. have Cherokee oil production at 1 West in NE NW NW 31-19s-19w, 11 miles southwest of LaCrosse and 2½ miles south of East Shiley field. A drill-stem test at 4,176-91 ft. got 510 ft. of froggy clean gassy oil, 610 ft. of clean gassy oil, and 1,050 ft. of gas in the pipe.

Dual discovery. Both Lansing and Arbuckle pays are reported at a wildcat 2 miles east of Great Bend, Barton County. The well is Nadel & Gussman et al. 1 Wood, NW NW NW 25-19s-13w, ½ mile north of Fort Zarah field. A drill-stem test in Lansing Pennsylvanian got 150 ft. of heavily oil-cut mud, 120 ft. of very heavily oil-cut mud with water trace, 120 ft. of heavily oil and gas-cut mud, 180 ft. oily water. A test at 3,180-3,200 ft. got 120 ft. of heavily oil-cut mud, 150 ft. of muddy oil, 30 ft. of water. From Arbuckle at 3,374-3,403 ft., flow was 2,830 M.c.f.d. Recovery was 90 ft. of gas-cut mud. Another test at 3,404-10 ft. got 120 ft. of oil.

Michigan clears way for gas marketing

The way has been cleared for marketing of natural gas from the Belle River field reef, St. Clair County.

At a public hearing most operators in the field requested that the Conservation Department declare the field a dry-gas pool in contrast to an oil-gas field. The department approved the request which automatically moved jurisdiction over to the Public Service Commission. Michigan Consolidated Gas Co. earlier had announced closing of preliminary gas-purchase agreements with developers of the field along with plans to build a 37-mile transmission line to the company's city of Detroit marketing system.

Belle River field as now drilled covers only 12 wells each on 40-acre units. However, "crest" wells cored as much as 300 ft. of gas-reef section with recovery estimates up to 30 billion feet per 40 acres.

TRICROME® RE-RING SETS are self-conforming and pre-lapped for quick seating and light-tight fit. Three of the four rings per piston are full-chromed.

NEW PARTS KITS factory-engineered
for WISCONSIN ENGINES

They're brand new — and packaged for safe, easy handling and big savings. Above all, the Wisconsin kits are factory-engineered for Wisconsin Engines only.

Our TriCrome® sets enable you to re-ring moderately worn, tapered, or out-of-round cylinders *for one-third the cost of reboring.* And now, you can also buy them in .010", .020", and .030" oversizes for the same price.

The Stellite valve, solid seat, and valve rotator conversion kit saves you the cost *of two to four ordinary valve jobs* for only $12.85 per valve . . . and our high-temperature safety switch *automatically* protects your Wisconsin Engine against burn out through overheating. The cost, $5.95.

Complete kits assure uniform like-new performance. And they cost less than if you bought the parts individually. Ask your Wisconsin Engine Service Station about them — and prices. Or send for Parts Bulletin Form S-280.

CHECK THESE TOO:

- 4-Pack Oil Filter Cartridge, with gaskets
- Fuel Pumps
- Fuel Pump Repair Kits
- Carburetor Repair Kits
- Major Magneto Repair Kits
- Magneto Point and Condensor Kits
- Spray Paint Kit, with Decals
- Tools to make your job easier

All are attractively priced and packaged!

WISCONSIN
MOTOR CORPORATION
Milwaukee 46, Wis.

WRITE TO HARLEY SALES CO.
619 SOUTH MAIN STREET • TULSA, OKLAHOMA
3420 MC KINNEY AVENUE • HOUSTON, TEXAS
605 SOUTH MAIN STREET • WICHITA, KANSAS
Oil Field Distributors for Wisconsin Engines and all types of Utility Units

World's Largest Builders of Heavy-Duty Air-Cooled Engines

CHICAGO PNEUMATIC · OIL TOOL DIVISION · FORT WORTH, TEXAS

DELIVERING MORE HOLE-MAKING ABILITY

When you specify CP Oil Tools you can be sure of top performance from our products . . . and from your CP Field Representative.

The CP Field Engineer who services your rig takes pride in *his availability* under the most difficult field conditions . . . and he takes pride in *his product* under every drilling condition.

Let him work with you to help keep your drilling program on schedule.

At CP we know that you've "no time for downtime!"

AVAILABILITY of manpower and tools is our around-the-clock responsibility . . . just as making hole is yours! Let us show you how the Cost-cutting Performance of CP in-hole tools pays off under the toughest field conditions.

Chicago Pneumatic
FORT WORTH, TEXAS

BITS • DRILL COLLARS
REAMERS • TOOL JOINTS

Oklahoma action spreads over entire state

THOUGH MOST of Oklahoma's development work seems centered in Kingfisher County of late, there are plenty of wildcat events across the state from far Cimarron to the Arkoma basin in the far eastern part of the state.

In the Oklahoma Panhandle, Apache Corp. completed 1 State Tract-9 in C SW SW 20-5n-6eCM, East Castenada field, Cimarron County. The well pumped 29 bbl. of oil per day from Marmaton at 4,163 ft. Final pump gage was 31½ bbl. daily.

Chitwood. Mobil Oil Co. has gas-condensate production from First Bromide Ordovician sand at 1 Craddock in C NE NW 33-5n-6w, Chitwood field, Grady County.

The well flowed 5,079 M.c.f.d. and 3 bbl. condensate per hour from 16,086-16,270 ft. This well is on the northwest strike of the same pay at Knox Deep field, the state's deepest producing area.

Arkoma basin. Midwest Oil Corp. is testing Red Oak sand at 1 Towry in N½ NE SW 11-6n-22e, on the east side of Norris Deep field in Latimer County.

The well flowed 18 M.M.c.f.d. from perforations at 6,865-7,087 ft. on ¾-in. choke. It flowed 4,500 M.c.f.d. on 20/64-in. choke with 2,000-psi. tubing pressure. Midwest 1 Gallagher, C SE NW 13-6n-21e, same area, flowed 1,350 M.c.f.d. from perforations in the Red Oak at 7,975-8,037 ft. It has formerly flowed 5,750 M.c.f.d. from deeper Spiro sand at 11,918-33 ft. Other Spiro perforations at 11,894-11,910 ft. will be tested.

Ambassador Oil Corp. 1 Richison unit in C NW SE 32-8n-20e, Kinta field, Haskell County, flowed 5,663 M.c.f.d. on ⅜-in. choke from basal Atoka pay at 5,625-37 ft. The Cromwell at 6,106-64 ft. is also a pay to be yet tested.

Midwest Oil Corp. 1 Martin, C SW NE 3-6n-22e, Norris Deep field, flowed 1,100 M.c.f.d. the first point, 2,270 M.c.f.d. the second, 3,213 M.c.f.d. the third, and 4,360 M.c.f.d. the fourth. Absolute open-flow potential is 9,400 M.c.f.d. Perforations are in Red Oak sand at 6,956-7,220 ft.

Deep test stops. Continental Oil Co. has temporarily abandoned a deep Oklahoma wildcat which had been projected to 20,000 ft. but stopped short at 17,323 ft.

The $1 million well was spudded last February in northeast Washita County, 9 miles south of Weatherford (OGJ, Feb. 27, p. 73). It is the 1 North Corn unit, 19-11n-14w.

Continental is a 71% owner of the well and has 12 partners. Because of the multiple ownership, Continental said last week its future plans on the well are indefinite. No information on logs or tests has been released.

Only WHELAND combines these features:

Wheland HP-16000 in Kingfisher County, Oklahoma. Left to right: Lavoy "Dink" Klutts, Tool Pusher; Jimmie Lynn Austin, V.P.; Paul Austin, Treas.

Planetary Gears
Oversize Bearings
Big Gear Reduction
Small Sheave
and Cylindrical
Crossheads

P. O. BOX 1240 PHONE 2600

Jimmie Austin & Sons, Inc.
Seminole, Oklahoma
August 1, 1961

Mr. Gordon P. Street, President
The Wheland Products
Division of Gordon Street, Inc.
Chattanooga, Tennessee

Dear Mr. Street:

As you know, we have used Wheland pumps for many years. From our own experience we became convinced that the Wheland HP-14000 Pump couldn't be beat.

But your planetary HP-16000 Pump is so quiet and smooth running that we are digging more hole faster and at less cost. Part of the increased penetration comes from the fact that the HP-16000 is bigger than the HP-14000. But that is only part of the story.

The new planetary gears let us use a much smaller sheave. The cylindrical crossheads, oversize bearings and the big gear reduction make the pump easier to pull, run smoother, and do a better job.

We have used this pump in Kingfisher County, Oklahoma, and find it just right for this area.

Yours very truly,

JIMMIE AUSTIN & SONS, INC.

By Jimmie Austin
President

JA:rmm

WHELAND PLANETARY
HP-16000

Duplex Power Slush Pump
7¾" x 16", 600 H.P. at 65 RPM

WHELAND

ROTARY DRILLING MACHINERY

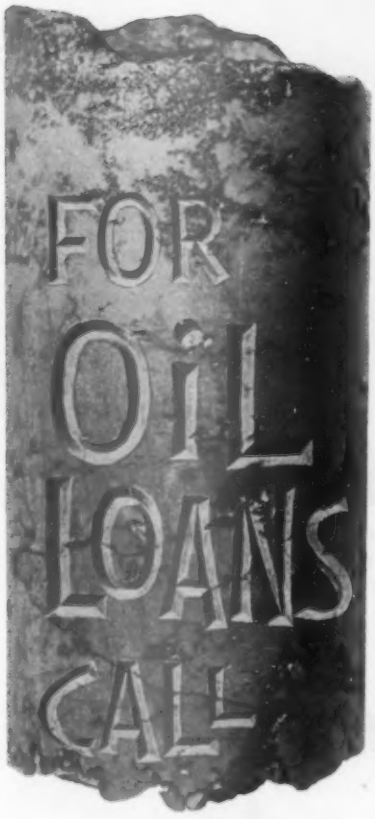
THE WHELAND PRODUCTS
DIVISION OF GORDON STREET, INC.
CHATTANOOGA, TENNESSEE, U.S.A.

DRAWWORKS • SLUSH PUMPS • ROTARIES
CROWN BLOCKS • TRAVELING BLOCKS • SWIVELS

DOMESTIC DISTRIBUTORS: INDUSTRIAL SUPPLY COMPANY, INC. —Main Office: Wichita Falls, Texas • HOUSTON OIL FIELD MATERIAL COMPANY, INC. — Main Office: Houston, Texas.

EXPORT DISTRIBUTORS: LUCEY EXPORT CORPORATION —233 Broadway, New York 7, New York — Broad Street House, London, E. C. 2, England.

HARRY L. DEDMAN, Vice President, Petroleum Engineer, and Manager of Texas Bank's Oil Department.



TEXAS BANK
AND TRUST COMPANY OF
DALLAS

MAIN AND LAMAR • DALLAS, TEXAS
PHONE RIVERSIDE 8-9141
Member Federal Deposit Insurance Corporation

Minnelusa discovery swabs oil in Crook County, Wyoming

Swab recovery of 55 bbl. of oil per hour for 7 hours is reported at Davis Oil Co. and Shell Oil Co. 1 Federal-Robinson, SW SE 22-50n-67w, Crook County, Powder River basin, northeastern Wyoming.

The well is 2 miles east of the north side of Robinson Ranch Minnelusa field. Perforations are at 5,650-56 ft. At another Minnelusa well in the basin, Shell swabbed 29 bbl. per hour for 2 hours at 32-2 Schuricht, SW SE 2 - 52n - 68w, Crook County. This is the north extension to Davis Oil Co.'s new Minnelusa discovery in SW NE 11-52n-68w.

Jefferson Devonian oil reported at Elk Basin test

Gage from the Jefferson Devonian at 189 Unit on Lot 5, 19-58n-99w, Elk Basin field, Park County, Wyoming, was reported last week by Pan American Petroleum Corp.

The deep test pumped 469 bbl. of oil in 24 hours with recovery 1% basic sediment. Interval is at 5,468-5,510 ft. This deep wildcat has already found production in Cambrian, Ordovician, and in two Devonian zones. None of these ever produced at Elk Basin before. Testing continues in the Jefferson zone.

Duperow Devonian oil flows at North Dakota discovery

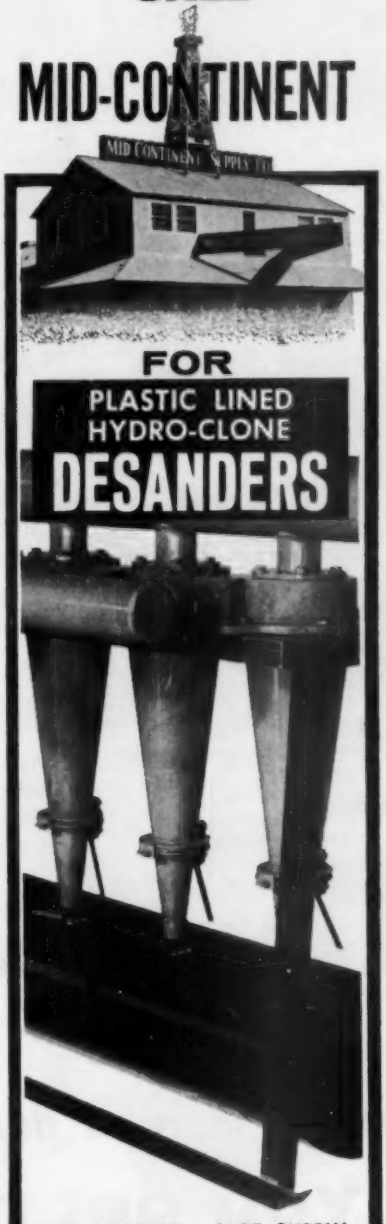
A wildcat in Keene field, McKenzie County, North Dakota, flowed 130 bbl. of oil in 8½ hours on 20/64-in. choke. The Duperow Devonian discovery is Texaco Inc. 2 Wisness, NW SE 3-152n-96w.

Perforations were at 10,882-10,903 ft. in Duperow. Keene field itself is a Madison Mississippian producer. Nearest Devonian oil is at Antelope field, 8 miles east.

Texas gets dual discovery

A dual oil discovery is reported by North Central Oil Corp. in a wildcat 6 miles southeast of Call, in Newton County, southeastern Texas. It is 2 miles west of North Newton field, nearest other production. "Blue Marsh" is proposed as the new field's name.

CALL
MID-CONTINENT



FOR
PLASTIC LINED
HYDRO-CLONE
DESANDERS

SURE SERVICE — SURE SUPPLY

MC7-1
MID-CONTINENT
SUPPLY CO.
THE WORLD'S LARGEST INDEPENDENT
OIL FIELD SUPPLY COMPANY
Mid-Continent Building, Fort Worth, Texas
Export Division: 45 Rockefeller Plaza,
New York 20, N.Y. Cable: MIDCUMPORT NYK

40,000 lbs. of mud pump being loaded on a Mack B61S belonging to B. M. Keller & Co., Inc., trucking contractors of Pampa, Texas. Driver W. W. Mays says "These Macks always get us where we're going and handle like a dream no matter where we take them."

Where more is demanded of a truck

You get more out of a Mack!

Draw works, mud pumps, drill rigs . . . the massive equipment used in oil field work is strictly in the heavyweight class. And when it comes to muscling around this kind of equipment, experienced oil field men know they can do it better with the strength and stamina that Mack trucks bring to the job. No ordinary trucks stand up to the wracking cross country hauls, the tortuous trips to off-highway drill sites, the way a Mack does.

The ability to get through—no matter what the weather or terrain—has made Mack the outstanding choice for tough oil field service. Extra strong frames and chassis take jolt and shock in stride, and the Mack exclusive Balanced Bogie with Power Divider transmits a bias of torque to the wheels with the best traction—gives Mack six-wheelers the ability to tackle the worst kind of going without bogging down.

Contact your nearest Mack Branch or distributor for proof of how a combination of Mack-built components like the exclusive Balanced Bogie with Power Divider can soften up your toughest hauls . . . make bogdowns and breakdowns a thing of the past. Mack Trucks, Inc., Plainfield, New Jersey. Mack Trucks of Canada, Ltd., Toronto, Ontario.

MACK
FIRST NAME FOR
TRUCKS

MACK
for over 8 straight years
NO. 1
by far in sales of diesel trucks

Best Break Yet!
FOR DRILL COLLARS AND TOOL JOINTS
JET-LUBE
Double Duty 21 Improved
TOOL JOINT COMPOUND
Full string service from "Swivel to Bit."
EXCLUSIVE FORMULA MFD. UNDER U.S. PAT. NO. 2,543,741
JET-LUBE INC.
3093 NO. CALIFORNIA ST., BURBANK, CALIF.
EXPORT OFFICE:
30 Rockefeller Plaza, New York 20, N.Y.

THE HOTEL
in the Oil Capital of the World
100% Airconditioned
600 Bright Reasonably Priced Rooms
THE MAYO
TULSA'S Finest HOTEL
Sample Rooms - Finest Food
Adjacent Garage

The discovery well, 1 B. E. Quinn Estate, is productive from Yegua sands. One is perforated at 7,086-88 ft., and the other at 7,183-86 ft. Hole was drilled to 7,920 ft., and has casing to 7,246 ft.

Potential gages rate the upper zone good for 227 bbl. of 45.8°-gravity oil daily, flowing through 10/64-in. choke with pressure of 1,775 psi. The lower zone made 197.70 bbl. of 44.7° - gravity oil daily through 9/64-in. choke with pressure of 1,110 psi.

Southeast New Mexico field adds second Devonian well

A south offset to the discovery well of a new Devonian field in Lea County, 12 miles northeast of Lovington, N. M., flowed 276 bbl. in 16 hours on 13/64-in. choke. The well is Sinclair Oil & Gas Co. 1 Reed Estate, south offset to the 1 Stone discovery in the northeastern part of Lea. Location is in 22-15s-38e, Southeast New Mexico.

Offshore Florida well is abandoned

The California Co. has plugged and abandoned an offshore Florida wildcat test 25 miles northeast of Fort Myers in the Boca Grande Pass area, but the company prepared quickly to give the disappointing Florida waters another try.

The Boca Grande well, drilled on a tract of Coastal Petroleum: went to 12,600 ft. It had been projected to 12,000.

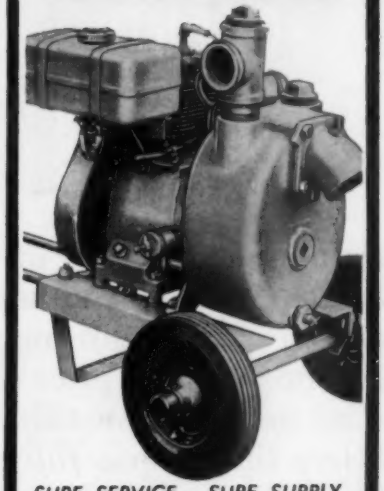
The new well is 3 Florida state tract 1011, located south of Marquesas Key. Calco's drilling barge S-45 is doing the drilling.

Lisbon field stretches southeast in Utah

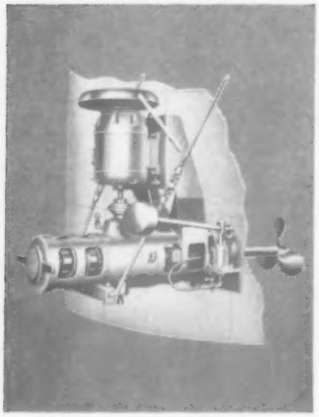
Utah's Lisbon field took a long jump southeast at Pubco Petroleum Corp. 2-21-F Lisbon - Federal in SE NW 21-30s-25e, San Juan County.

This southeasternmost producer in the field flowed 6,500 M.c.f.d. from 9,269-9,313 ft. in the Mississipian. There has been no Mississipian drilling in this township.

CALL
MID-CONTINENT

FOR
ROTARY PUMPS CENTRIFUGAL

SURE SERVICE — SURE SUPPLY
MC8-1
MID-CONTINENT SUPPLY CO.
THE WORLD'S LARGEST INDEPENDENT OIL FIELD SUPPLY COMPANY
Mid-Continent Building, Fort Worth, Texas
Export Division: 45 Rockefeller Plaza, New York 20, N.Y. Cable: MIDCUMPORT NYK

NEW



for sediment control

Beginning today, all other side-entering mixers are out of date. ¶ The LIGHTNIN Mixer you see here is a 50-horsepower Hi-Flo unit. It does the work of *three* 25-hp mixers on a big blending tank. ¶ It saves you one-half the purchase price of three 25-hp mixers • almost two-thirds the installation cost • and one-third of the operating cost. ¶ You can now get LIGHTNIN Mixers like it in a *full range of sizes up to 50 hp.* This new line provides 50% more flow per horsepower. It is called LIGHTNIN Series NSE. ¶ At every size level, these units equipped with new Super-Pitch propellers provide extra pumping capacity. Capacity that translates into better sediment control, or sediment control at lower installed cost. ¶ For information, call your LIGHTNIN Mixer representative now. He's listed in Refinery Catalog and in the yellow pages of your telephone directory. Or write, wire, phone us direct for Bulletin B-526.

Lightnin® Mixers

MIXCO fluid mixing specialists

MIXING EQUIPMENT Co., Inc., 174-m Mt. Read Blvd., Rochester 3, N.Y.

In Canada: Greey Mixing Equipment Ltd., 100 Miranda Avenue, Toronto 19, Ont.

In Europe: Lightnin Mixers Ltd., Poynton, Cheshire, England

MARTIN RUBBER & DUCK RINGS give excellent life in dirty abrasive fluids . . . high or low gravity . . . much or little water . . . shallow or deep wells. They last for years in the easier pumping wells. Replacement rings cost comparatively little.

MARTIN PLUNGER BODIES, precision grooved, drilled and threaded (no underneath fluid passage), usually last for years. Tube or barrel costs are often cut in half.

The replaceable SYNTHETIC RUBBER GUIDES in MARTIN CAGES last longer than any metal, and the cushioning of the ball increases your ball & seat life. Results are often truly amazing. (Patent No. 2,591,174)

Write for our new catalog or see it in the Composite (24th Edition). All products sold thru supply companies.

JOHN N. MARTIN
Manufacturer
9 W. BRADY STREET • TULSA, OKLAHOMA

Other wells in the area are Pure Oil Co. 1 Spiller Canyon USA-B, SE NE 20-30s-25e, west of Pubco's well, Calvert Exploration Co. 1 USA-Kimbell in SW NW 18-30s-25e, and Pure 1 Spiller Canyon-USA in SW SW 17-30s-25e. All are going to Mississippian, and are between Pubco's success and Lisbon field itself, more than 2 miles west.

Bitter Creek unit. A drill-stem test at 4,380-4,434 ft. got 10 M.M.c.f.d. from Tertiary at DeKalb Petroleum 1 Bitter Creek unit in SE NW 34-10s-22e, Uintah County, Uinta basin, Utah.

This 5,000-ft. wildcat is 2¼ miles south of Ute Trail field and 4 miles northwest of Rock House field. There has been no drilling between the Bitter Creek unit and the other two fields.

Texas' Gonzales County discovery is confirmed

Discovery of deep Edwards production by Superior Oil Co. early this year east of Smiley in southern Gonzales County, near the DeWitt county line, in Texas' central coastal region, has been confirmed in Superior's second well.

The new well, 1-A Georgia Dubose, a mile northeast of the initial Dubose discovery, not only is productive from that well's pay, but also from a slightly deeper zone, and has been dually completed.

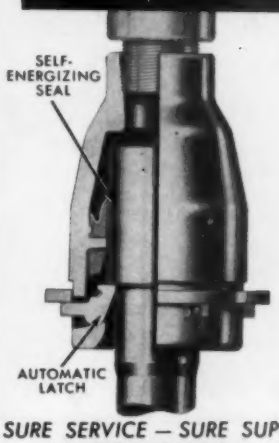
The discovery well (1 Georgia Dubose) is a single-pay completion with perforations at 12,064-138 ft. Completed in February, it tested for 2,320 M.c.f. of gas and 57 bbl. of condensate per day. Its pay was designated at "A" zone.

The second well tested 4,780 M.c.f. of gas and 101 bbl. of 53.2°-gravity condensate per day through 20/64-in. choke from that zone, perforated at 11,924-64 ft., 11,974-80 ft., and 12,000-10 ft.

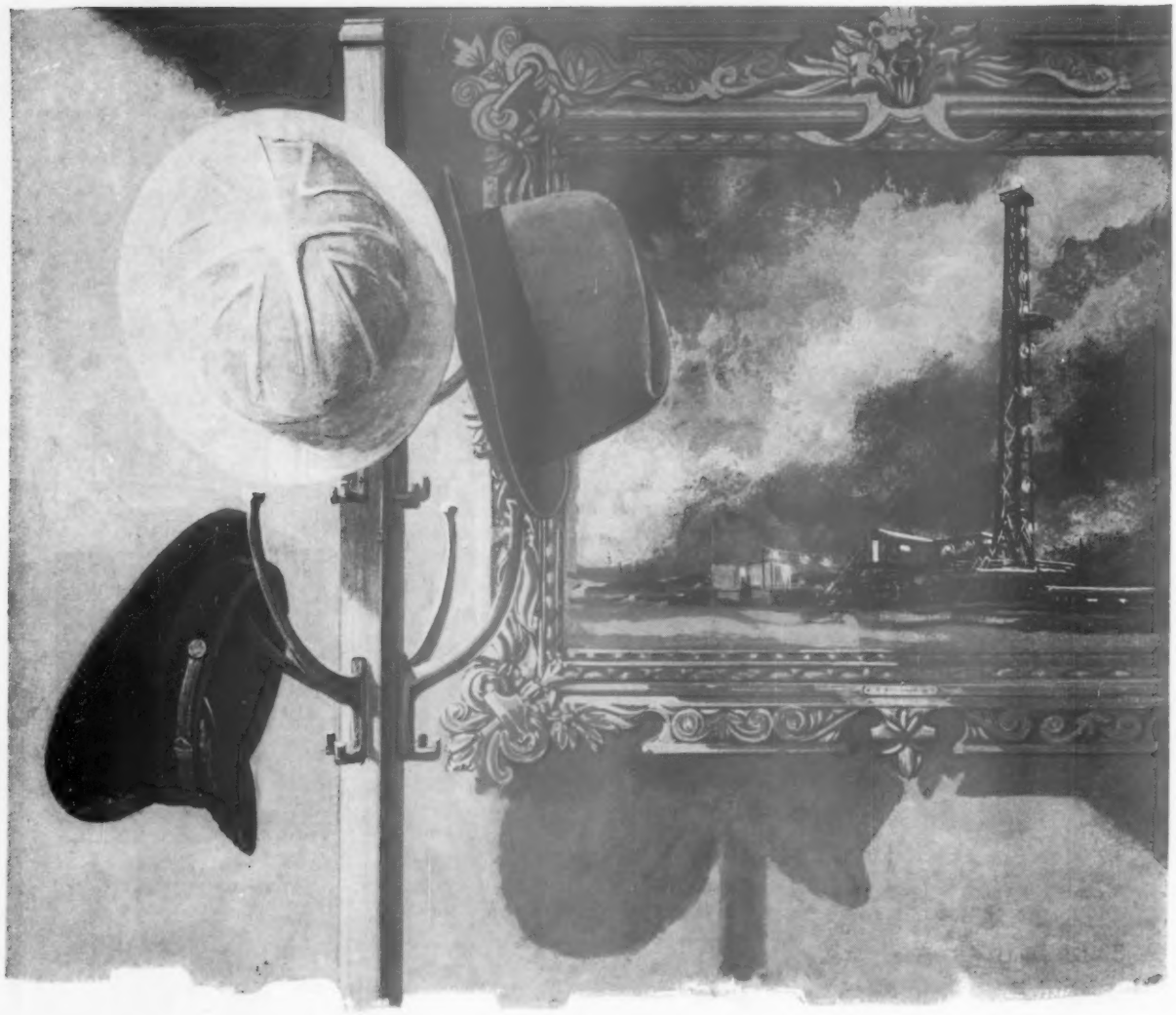
Its new-pay, designated as Zone "B," is perforated at 12,170-12,210 ft. Flow from this zone, tested through 18/64-in. choke, was at the rate of 4,612 M.c.f. of gas and 76.5 bbl. of 52.7°-gravity condensate per day.

Shut-in pressures of the two zones are 2,250 and 2,725 psi., respectively.

CALL
MID-CONTINENT

FOR
NEW
REGAN
FAST
SHUTOFF
COUPLING


SURE SERVICE — SURE SUPPLY
MC9-1
MID-CONTINENT
SUPPLY CO.
THE WORLD'S LARGEST INDEPENDENT
OIL FIELD SUPPLY COMPANY
Mid-Continent Building, Fort Worth, Texas
Export Division: 45 Rockefeller Plaza,
New York 20, N.Y. Cable: MIDCUMPORT NYK



RHIA [RANK HAS ITS ADVANTAGES]

For decades, oil and gas men have turned to the Republic for the many varied and special bank services they require. Republic knows you must have accurate fact and figure data, prompt decisions on financing, and frequently, bank counselling with your lawyer on regulations and tax matters.

As a pioneer oil bank in the South . . . with the South's largest Oil and Gas Department, Republic is uniquely equipped by experience, knowledge and resources to give you the complete, specialized service you need.

Doing business with Republic Bank indeed has its advantages and they are in your favor. Next time, talk to Republic, indisputably a leader in the field of oil and gas financing. We're here to serve you.

REPUBLIC NATIONAL BANK
OF DALLAS

"My Bank" to the Oil and Gas Man

MEMBER, F.D.I.C.

CAPITAL AND SURPLUS $105,000,000 ★ LARGEST IN THE SOUTH

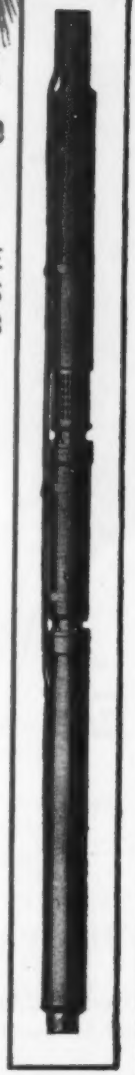
INCREASE PROFITS WITH REDA Submergible PUMPS

REDA GIVES YOU THESE COST SAVING FEATURES AND DOES THE JOB BETTER!

- Lower cost for installation, operation and maintenance.
- 250 to 18,000 BPD capacities
- Depths to 10,000 ft.
- Corrosion-resistant construction
- Long life — dependable service
- A complete line to meet pumping requirements

and

INVESTMENT COST IS FAR LOWER WHEN YOU CHOOSE REDA FOR YOUR PUMPING NEEDS.



Write or call for more information. Reda engineers will be pleased to assist and help plan your operations.

SIGN OF QUALITY SUBMERGIBLE REDA PUMPS

REDA PUMP CO.
BARTLESVILLE, OKLAHOMA
Manufacturers of submergible motors and pumps for over 35 years — for oil, brine and water wells, gasoline and jet fuel

Matagorda County adds another Frio strike

DISCOVERY of another Frio sand gas field is reported in the Texas Gulf Coast's active Matagorda County.

The discovery well, drilled by Robert Mosbacher, Harry Hurt, and Z. W. Falcone, is 3 miles northeast of El Maton. It is 2 miles northeast of El Maton field, nearest production, and is expected to be named East El Maton.

Production, rated good for 40 M.M.c.f. of gas daily, is from a perforated interval at 10,056-62 ft. Gas carries 54°-gravity condensate with a gas-liquid ratio of 12,270 cu. ft. per bbl. shut-in pressure is 3,700 psi.

Total depth of the well (1 Mignon Doman) is 10,217 ft.

Another nearby Matagorda County Frio field at Trull, on the Jackson County line, has added another good well. There, Texkan Oil Co. has completed its 1 Nueszer for an open-flow potential rating of 10 M.M.c.f.d of gas from pay at 9,819-22 ft. It has a gas-liquid ratio of 26,300 cu. ft. per bbl., making 60.8°-gravity condensate. It is shut-in with top pressure of 3,679 psi.

At Duncan Slough, south of Buckeye and the new East El Maton discovery, Continental Oil Co. has completed its 1 Louise Steele, making 6,200 M.c.f.d. of wet gas on open-flow potential from Frio 7-B zone at 11,252-62 ft., and 74 M.M.c.f. of wet gas from Frio 8 zone, at 11,338-48 ft. and 11,354-60 ft.

East Texas well gets prolific gas flow

Completion gages give Pan American Petroleum Corp.'s new Smackover discovery-well at Edgewood, in Van Zandt County, East Texas, an open-flow potential rating of 19,600 M.c.f.d. of gas with 133 bbl. of 55.9°-gravity condensate per million cubic feet.

The discovery well, 1 Parker, a mile southeast of Edgewood townsite, is 5 miles from the nearest other Smackover production, in Fruitvale field to the south. Next nearest Smackover production is 15 miles northeast at Ginger, in Rains County.

Pan American's well is perforated

CALL MID-CONTINENT

FOR SUCKER RODS

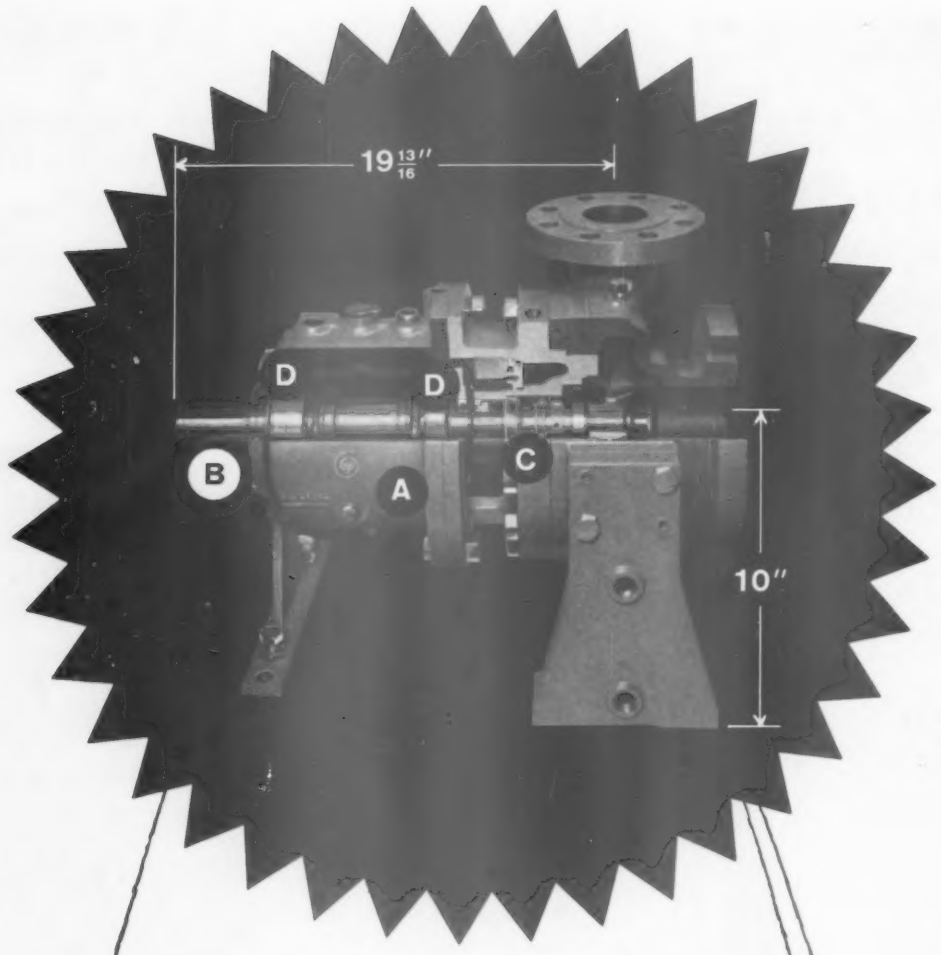
SURE SERVICE — SURE SUPPLY

MC10-1

MID-CONTINENT SUPPLY CO.

THE WORLD'S LARGEST INDEPENDENT OIL FIELD SUPPLY COMPANY

Mid-Continent Building, Fort Worth, Texas
Export Division: 45 Rockefeller Plaza, New York 20, N.Y. Cable: MIDCUMPORT NYK



IT SHARES SPARES

Cut parts inventory with this high-temperature process pump

You can stay covered for any emergency with a small stock of parts when Goulds Model 3775 pumps your hot —or cold—liquids. That's because all 12 pump sizes are built on one bearing frame **(A)**. One shaft **(B)**, one seal **(C)**, and one bearing set **(D)** for every pump. One coupling fit, too.

Save Process Design Time. Constant dimensions make it easier for you to design your process. Length of shaft and height from base to suction centerline are the same for all 12 sizes.

Back Pull-Out Makes Upkeep Easy. Seal replacement and maintenance are simple. A millwright alone can remove the rotating parts without disturbing the pipe connections or driver.

Cooled Seal. Hot pumpage never touches the mechanical seal. Seal is isolated in its chamber, surrounded by cool, dead-ended liquid. Coolant circulates through jacket, keeps seal face down to 250°F. *even when pumpage reaches 750°F.*

Cooled Bearings. Bearings last longer because water-cooled housings keep their temperature constant.

Versatile. An economical solution for cold as well as hot services, this single design covers an extremely wide range of applications. It handles temperatures from −350° to +750°F.

The Model 3775 is built to API specs, handles pressures to 600 psi, capacities to 1200 gpm and heads to 500 feet.

For a more complete story on how Model 3775 can help you cut pumping costs, write for Bulletin 724.1. It contains a parts interchangeability chart, dimensions, pressure-temperature chart and other helpful information.

Goulds Pumps, Inc., Dept. OGJ-111, Seneca Falls, N. Y.

GOULDS PUMPS

Jimmie Gray®
500 TON
. . . now with
POLARIZED
ADDITIVE!

Greater "Clinging" Power for Increased Thread Protection!

Used on more wells throughout world-wide drilling industry!

SOLD ONLY THROUGH SUPPLY STORES

MONEY BACK GUARANTEE

USE JIMMY GRAY DOPE BRUSHES

PETROLEUM DISTRIBUTING CO.
BOX 703—HOUSTON, TEXAS—CApitol 4-9648

at 12,834-12,900 ft. in the upper part of the Smackover. Bottom of hole is 13,704 ft.

In the meantime, Pan American is starting an offset to Humble Oil & Refining Co.'s recently completed Smackover discovery that extended the West Yantis field, in northwestern Wood County, 3 miles westward into northeastern Rains County. The new test, 1 Allen Gas Unit, is 2,000 ft. northwest of Humble's well, 1 Beall-West Yantis Gas Unit, rated good for 46,500 M.c.f.d. of gas from perforations at 12,588-12,618 production of its West Yantis field where it hopes to extend Smackover into southern Hopkins County.

Upton County Ellenburger discovery completed in Texas

An important Ellenburger discovery was completed in Upton County, West Texas. Blue Danube Oil Co. - H. F. Neal flowed 268 bbl. of 51.2°-gravity oil plus 17% water on 24-hour potential test on 32/64-in. choke. Perforations were at 11,165-11,259 ft.

This well was completed earlier in Pennsylvania Strawn at 9,336-42, 9,356-64, and 9,379-90 ft. It flowed 637 bbl. of 43.1°-gravity oil per day on 16/64-in. choke. Location is in Section 26, Block B, HE&WT Survey, 7 miles northwest of Block 4 Multipay field.

Concho completion. Continental Oil Co. completed 1-A H. R. Campbell as the second Strawn well in Paint Rock Strawn field, 7 miles southeast of Paint Rock.

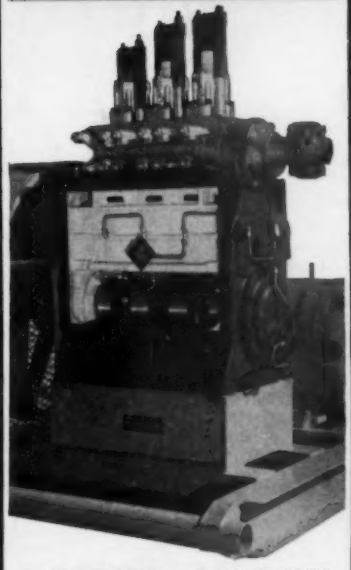
The well flowed 46,400 M.c.f.d. from perforations at 3,427-35 and 3,443-50 ft. Location is in Section 137, Block 72, T&NO Survey.

First Quadruple well. Texaco Inc. 3 F. Clark Jr. in North Andrews field, Andrews County, was completed as the first quadruple producer in West Texas.

The well is producing from Ellenburger, Devonian, Pennsylvanian, and Wolfcamp Permian. From Ellenburger open hole at 12,457-77 ft., the well flowed 430 bbl. of oil daily on 10/64-in. choke. From Devonian perforations at 10,500-20 ft. it pumped 140 bbl. per day. From Pennsylvanian perforations at 9,022-94 ft. it flowed 166 bbl. per day on 20/64-in. choke, and from

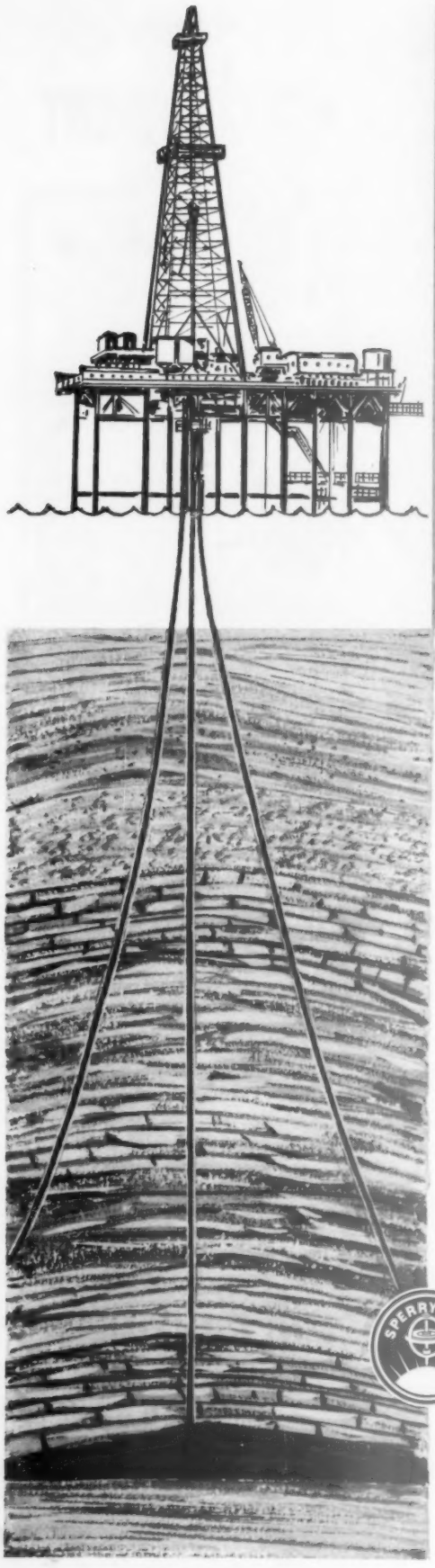
CALL
MID-CONTINENT

FOR
INJECTION PUMPS



SURE SERVICE — SURE SUPPLY

MC11-1
MID-CONTINENT
SUPPLY CO.
THE WORLD'S LARGEST INDEPENDENT OIL FIELD SUPPLY COMPANY
Mid-Continent Building, Fort Worth, Texas
Export Division: 45 Rockefeller Plaza, New York 20, N.Y. Cable: MIDCUMPORT NYK



better instruments give better facts for better control...

METHODS AND DEVICES ORIGINATED BY SPERRY-SUN ESSENTIAL TO WELL SURVEYS AND DIRECTIONAL DRILLING

ORIGINATED first straight hole instrument (the Syfo Clinograph) generally accepted by the industry.

ORIGINATED only gyroscopic bore hole directional instrument in use in the United States.

ORIGINATED use of non-magnetic drill collars — an outstanding contribution to directional drilling.

ORIGINATED orientation of directional drilling tools in the bottom of hole. (Directional drilling could not be economically done without this Sperry-Sun method and the use of non-magnetic drill collars.)

ORIGINATED the taking of side wall cores.

And today Sperry-Sun leads with these better instruments and methods for better facts to give you better control on land or offshore:

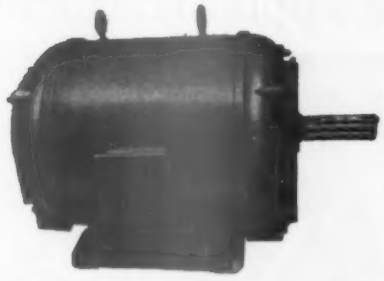
- SPERRY-SUN MAGNETIC DIRECTIONAL SINGLE SHOT
- SPERRY-SUN E-C INCLINOMETER
- SPERRY-SUN (MAGNETIC) MULTI-SHOT DIRECTIONAL SURVEYS
- SURWEL (GYROSCOPIC) MULTI-SHOT DIRECTIONAL SURVEYS
- K-MONEL NON-MAGNETIC DRILL COLLARS
- M-M-O MAGNETIC METHOD OF ORIENTATION

SPERRY-SUN WELL SURVEYING COMPANY

3118 Blodgett Avenue • Houston, Texas

Field Offices: Houston, Corpus Christi, Odessa, Marshall, Wichita Falls, and Pampa, Texas; Lafayette and New Orleans, La.; Long Beach, Bakersfield and Ventura, Calif.; Oklahoma City, Okla.; Brookhaven, Miss.; Casper, Wyo.

For Uninterrupted
POWER FLOW
in the
OIL FIELDS
You Can Rely on
FIELDMASTER
ALL WEATHER
BALL BEARING MOTORS



Available in SEMI and TOTALLY enclosed models, with special high temperature Class "B" or better insulation in all critical parts, and with Stators double dipped with Class "F" special insulating varnish which provides an especially effective resistant to heat, aging and moisture.

Yes, you will find FIELDMASTER MOTORS unusually efficient in overcoming all adverse conditions because they are

- MOISTURE PROOFED
- VERMIN PROOFED
- CORROSION RESISTANT
- SEALED TERMINAL BOX

So, why not write TODAY for fully descriptive literature

BETHLEHEM STEEL CO.
SUPPLY DIVISION
TULSA, OKLAHOMA

Manufactured By
Valley Electric Corporation, St. Louis 8, Missouri

Wolfcamp at 8,606-18 ft., it pumped 108 bbl. per day. Location is in Andrews townsite in Section 17, Block A-46, PSL Survey.

New Mexico. Gulf Oil Corp. 1 Levi Harris, southeastern Lea County, 8 miles northwest of Hobbs, flowed 160 bbl. of oil in 17 hours on 20/64-in. choke from Wolfcamp perforations at 10,001-8, 10,015-21, 10,028-44, 10,068-77, and 10,112-16 ft. Location is in 21-17s-38e, 3½ miles southwest of South Knowles field.

El Paso and Western Natural 1 Mescalero Ridge unit-federal, Lea County, 18 miles southeast of Maljamar, flowed 933 bbl. of oil from Bone Spring at 10,118-34 ft. and 1,300 M.c.f.d. from Morrow at 13,328-40 ft. Location is in 21-19s-34e, 1¾ miles southeast of Mescalero Morrow gas area.

Lower Leonard Permian discovery finaled in Martin County, West Texas

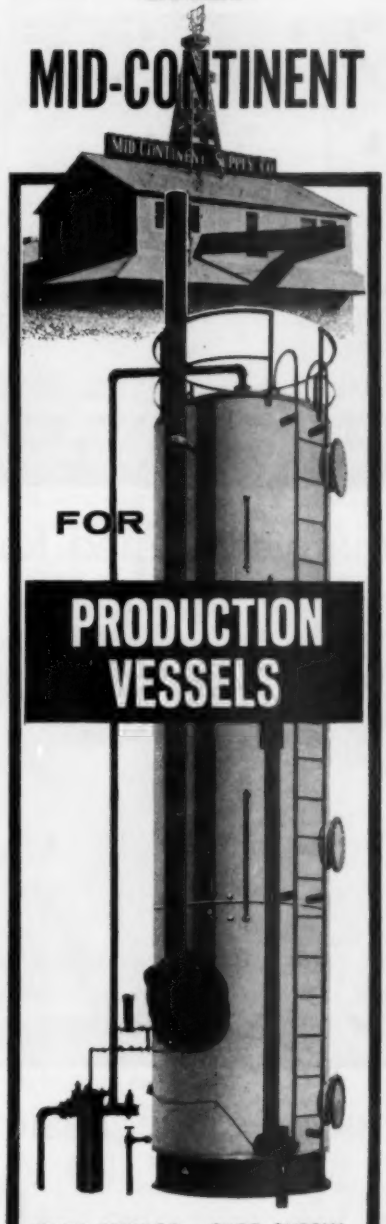
A northwestern Martin County wildcat was completed flowing 289 bbl. of 39°-gravity oil daily on 16/64-in. choke from perforations at 9,204-88 ft. The well is J. C. Williamson Trustee 1 Wolcott, 10 miles northwest of Tarzan.

This new discovery is located in League 251, Ward CSL Survey, 4 miles southeast of Breedlove field and 1¾ miles southwest of Wolcott field.

Ector County. McGrath & Smith 1-C A. B. Connell, an earlier Ellenburger completion in Metz field, is now also a Waddell producer. The well made 288 bbl. of oil in 24 hours on 18/64-in. choke from perforations at 8,804-16 ft. in the Waddell zone. From Ellenburger it had flowed 253 bbl. per day on 20/64-in. choke. Location is in Section 8, Block B-16, PSL Survey, 4 miles southwest of Penwell.

Howard County. Cabot Corp. 1 S. L. Lockhart, 5 miles southeast of Vealmoor, northern Howard County, flowed 252 bbl. of 40.1°-gravity oil per day on 20/64-in. choke from perforations in the Fusselman Silurian at 9,841-49 ft. Location is in Section 38, Block 32, T-3-N, T&P Survey, 1 mile southeast of Vealmoor field.

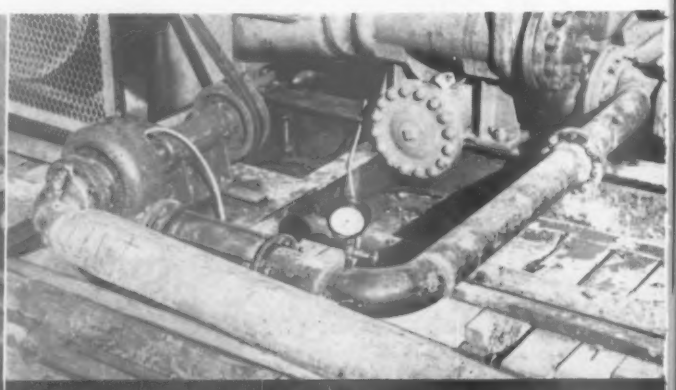
CALL
MID-CONTINENT



FOR
PRODUCTION
VESSELS
SURE SERVICE — SURE SUPPLY
MC12-1
MID-CONTINENT
SUPPLY CO.
THE WORLD'S LARGEST INDEPENDENT
OIL FIELD SUPPLY COMPANY
Mid-Continent Building, Fort Worth, Texas
Export Division: 45 Rockefeller Plaza,
New York 20, N.Y. Cable: MIDCUMPORT NYK

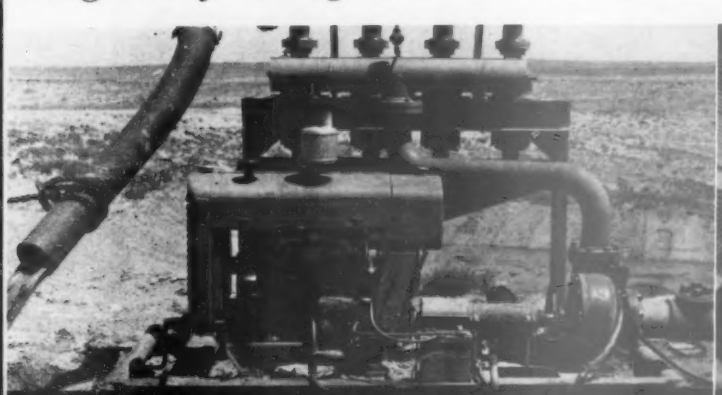
Mission centrifugal pumps for oilwell drilling rig service

MUD PROCESSING — Large volume capacity permits fast, uniform rolling for mixing and treating. Permits rapid addition of lost circulation material when using the special Mission Mud Mixing Hopper.

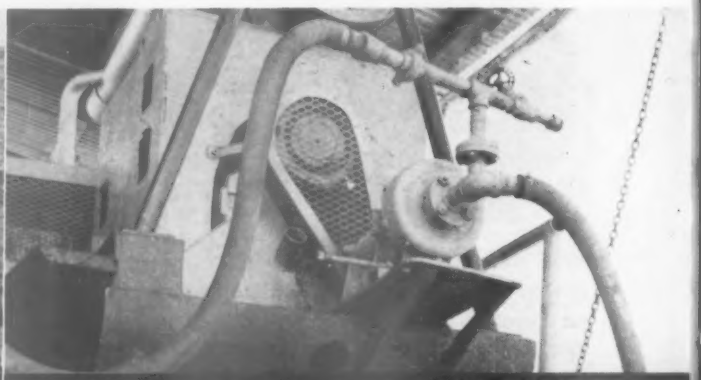


MUD PUMP SUPER-CHARGING — Keeps mud pump at peak efficiency. Prevents mud pump from knocking. Increases mud pump volume when mud is air or gas cut.

originally designed for the most rugged rig applications afford

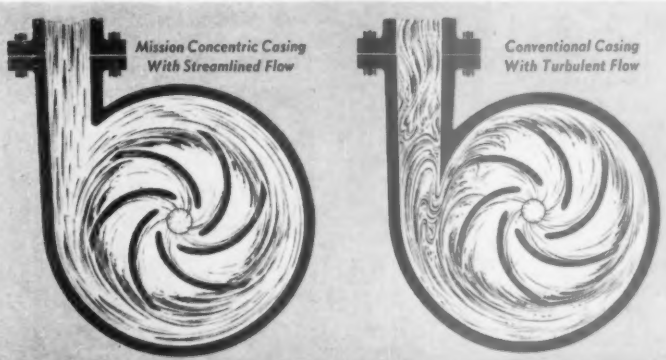


DEGASING AND DESANDING — Mud volume and mud pressure effectively operates degaser and desander equipment.

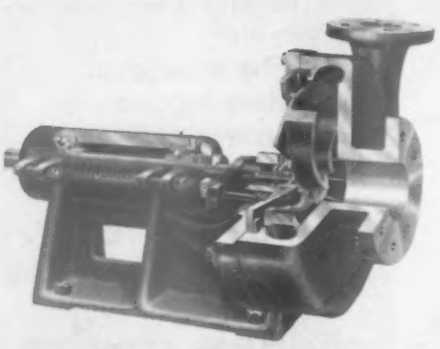


RIG WASH-DOWN AND BRAKE COOLING SERVICE — Provides large volumes and adequate water pressure for economical safe operations.

longer service, easier maintenance, trouble free operation—



MISSION CENTRIFUGAL PUMPS LAST LONGER, WORK BETTER — Streamlined flow is obtained in the concentric casing, because the restriction at the discharge as found in the conventional casing has been eliminated. This design minimizes wear and maintains rated output longer under difficult abrasive and corrosive conditions.



even in highly abrasive service

MISSION MANUFACTURING CO.

P. O. BOX 4209 · HOUSTON, TEXAS
OVER THIRTY YEARS OF DRILLING RESEARCH

PROFILE

Russell supports area pricing

New West Central Texas Association president feels area-price method is best way out of gas-regulation mess.

AREA pricing for natural gas appears the only way out of the present regulatory chaos—the only way, that is, which is both reasonable and still within reach.

This is how James E. Russell sees the gas situation. And one of his prime aims as new president of the West Central Texas Oil and Gas Association, with membership backing, will be to speed area-pricing implementation.

The simpler the area-pricing formula, the better it will work, Russell thinks. Such a formula should not consider depth, reservoir characteristics, or whether gas is "new" or "old" as price-varying factors.

"Considering the geological and engineering aspects as price factors could quickly make pricing so complicated as to render an area price virtually meaningless."

Russell feels quality characteristics perhaps should be considered—such as the B.t.u. content, whether the gas is sweet or sour, etc.

Gas pricing, of course, isn't the only front on which Russell will be active as head of one of the most active regional producer associations.

Reduced oil imports, modification of outdated Texas regulations, and more stringent enforcement of ratable taking of oil and gas are other important targets.

Russell, independent operator and owner of Russell Engineering, Abilene, Tex., is probably, at 44, one of the association's youngest presidents. But he's packed oil into most of those years, starting as a roustabout and tool dresser in 1933 near Chanute, Kans., after school and during the summers.

After graduating from the University of Kansas in 1941 with a BS degree in petroleum engineering, Russell went to work for the Texas Co. in South Texas.

Goes consultant. After 3 years in the U. S. Army Air Force, he joined Earlougher Engineering in Tulsa in December 1945, an association which led him to pursue oil consulting as a career. For nearly 4 years, Russell designed waterflood projects and development operations with Earlougher.

JAMES E. RUSSELL

He resigned in 1949 to join Riley G. Maxwell in Abilene, where he assisted in setting up a core-analysis section specializing in water flooding and reservoir studies. In 1951, he joined Reddin Unit Water Flood as unit manager and engineer and at the same time started a private consulting practice which became Russell Engineering in 1953.

Since then his firm has assisted in investigating and supervising several hundred water floods in New Mexico, Texas, Oklahoma, and Kansas.

Heads oil studies. In the past few years, Russell has headed two special committees of the association which dealt directly with questions of a highly sensitive nature in Texas.

One concerned itself entirely with the problem of well spacing. The other was a study of factors affecting allowables in Texas.

Both were widely recognized by independent operators. And the ultimate compliment to Russell and other members of the committees came when the reports and stands taken by the West Central group were adopted as policy by other producer associations in the state.

Industry dynamo. Prior to taking over the association presidency, Russell had served it as vice president three times. This, however, isn't his only association interest.

He was one of the founders of the West Central Texas Water Flood Association and served as its chairman during its first 2 years.

He is a director of the Society of Petroleum Engineers of AIME and has served as chairman of its West Texas Section. He is a member of the Interstate Oil Compact Commission, of the secondary-recovery committee of the Independent Petroleum Association of America, and of the Texas and National societies of professional engineers. He also is a director of the Texas Mid-Continent Oil and Gas Association.

In 1958, Russell was selected by the staff of the petroleum-engineering department of KU as recipient of the Eugene A. Stephenson "distinguished alumni" award.

●

J. E. Helzman has been named district geologist for Shell Oil Co.'s Salt Lake City exploration district. He succeeds **J. B. La Fevers,** now a geologist on Shell's Pacific Coast exploration staff.

Fred Ramseur, manager of Cities Service Petroleum Co.'s natural gasoline division, has been elected chairman of the executive committee of National LP-Gas Council. He succeeds **A. B. Ritzenthaler,** Tappan Co., who has been elected council president.

James D. Leonard, vice president and secretary of Leonard Drilling Co., Mount Pleasant, Mich., and **William E. Heller,** superintendent for Leonard Oil, Inc., in Lake City, Mich., have retired.

Dr. Irving Kuntz has been appointed head of the exploratory research section in the chemicals research division of the Esso Research & Engineering Co., Linden, N. J.

PERSONALS

Humble Oil & Refining Co. has announced two promotions in its Memphis area, which handles marketing in Tennessee, Arkansas, Kentucky, and parts of Alabama and Mississippi. **T. Frank Smith, Jr.,** formerly service station and reseller sales coordinator in New Orleans, becomes Memphis area manager. **R. B. Abney,** formerly manager of the Little Rock district, was appointed Memphis area marketing manager.

Howard C. Duke, special assistant to the president of Zapata Off-Shore Co. in Houston, has been promoted to vice president and manager of operations. He will also serve as corporate secretary. **Ian Figart,** vice president, has resigned from the company. Duke was drilling superintendent for Shell de Venezuela before joining Zapata in 1959.

N. B. Ingram, Floyd L. Miles, and **Frank B. Fulenwider,** sales division vice presidents for DX Sunray Oil Co., have been elected directors of the company.

T. B. (Tom) Murphy has been elected president of Western Oil & Fuel Co., Minneapolis, and International Refineries, Inc., Wrenshall, Minn. Murphy, executive vice president of Western since last May, succeeds **Henry M. Baskerville, Sr.,** who resigned as president of both companies to devote full time to Upper Mississippi Towing Corp., of which he is chairman of the board. Murphy joined Western in 1952 as vice president of marketing. Western and International are affiliates of Continental Oil Co.

MURPHY

W. A. Heath has resigned as head of the petroleum engineering department of Earlougher Engineering to set up offices in Tulsa as water-flood consultant. Heath was chief water-flood engineer for Phillips Petroleum Co. before joining Earlougher in 1946.

BAUCUM EPLEY GREEN WOODRUFF MINGAY

Texaco executives get new assignments

Arch W. Baucum and Marion J. Epley, Jr., have been named to the new post of executive vice president for Texaco, in a move which triggers a series of executive changes.

Baucum had been serving as vice president in charge of the domestic producing department since 1958. He will be succeeded as production vice president by Homer O. Woodruff, general manager, domestic producing.

Epley had been senior vice president in charge of world-wide marketing. John W. Green, vice president of domestic sales, will step into the world-wide marketing post.

John I. Mingay, general manager of the domestic sales department, will succeed Green as vice president and department general manager.

New appointments also have been made in the domestic producing department as a result of Woodruff's promotion.

Harry X. Bay, New Orleans division manager, has become department general manager, succeeding Woodruff. Bay will headquarter in Houston. Louis T. Tighe, Houston division manager, will be assistant general manager of domestic producing, Houston.

Bay will be succeeded in New Orleans by James W. Rawley, Tulsa division manager.

William W. Moore, assistant Houston division manager, will succeed Tighe as division manager there, and Olvin F. Sebesta, assistant general manager in Houston, will move to Tulsa as manager.

John H. Johnsen has been named director of technical service and operating procedures for American Oil Co. at its Chicago general office. He replaces **Walter T. Herget,** who was transferred to foreign operations with Standard Oil Co. (Ind.), American's parent company. **Norman T. Robey,** manager of American's Neodesha, Kans., refinery, succeeds Johnsen as manager at Wood River, Ill., refinery. **Edward R. Grey** replaces Robey as manager at Neodesha, and **Delmer G. Debo,** assistant manager at the Casper, Wyo., refinery, succeeds Grey as manager of the Baltimore, Md., refinery.

J. C. Donnell II, Ohio Oil Co. president, will receive the American Petroleum Institute's Carl A. Young Memorial Award at the API meeting November 14 in Chicago. Donnell is being recognized for service in 1951-52 as API vice president for production and for his chairmanship from 1954-59 of the institute's program and budget review committee.

Mitchell Stark, who recently completed a 3-year loan assignment as head of operations (fields) for Iranian Oil Exploration & Production Co., has returned to the United States as senior research engineer for Jersey Production Research Co. in Tulsa.

E. C. Masterson, general manager in London for Kuwait Oil Co., Ltd., has been appointed assistant managing director of the company. He succeeds **L. T. Jordan,** who has retired. Masterson will headquarter in London. Also, **Edward Boaden,** general manager, Kuwait, has been given responsibility for all operations in Kuwait. **Hugh L. Scott** has been named deputy general manager in Kuwait.

Wilbur W. Heard, general attorney for Pan American Petroleum Corp., has been named general counsel and a director of the company. He succeeds **Leslie A. Thompson,** who has retired. **Joe P. Hammond** will succeed Heard as general attorney.

Murphy Corp. has named **John M. Brown** to the newly created post of general manager of manufacturing. Brown, who has been manager of Murphy's Superior, Wis., refinery since February 1959, will move to company headquarters at El Dorado, Ark., and direct refining operations at Superior and Meraux, La. **Charles E. Cowger,** who has been technical assistant to the executive vice president since 1956, becomes assistant manager of manufacturing. **Russell H. Gasaway,** superintendent of the Meraux refinery since 1953, replaces Brown as manager of the Superior refinery. **O. Paul Doyle** has been promoted from chief process engineer at Meraux to superintendent, replacing Gasaway.

Clare R. Wolf of Chicago has been named executive vice president and director of Tuloma Gas Products Co., Tulsa.

Wolf formerly was deputy coordinator of marketing on the staff of the vice president for marketing, supply, and distribution of Standard Oil Co. (Ind.), Tuloma's parent company. At Tuloma, he will direct marketing activities of LPG, natural gasoline, sulfur, and the company's recently acquired line of nitrogen products.

Hugh L. Myers is new assistant refinery engineer at Sun Oil Co.'s Marcus Hook, Pa., refinery. **James R. Calkins** succeeds Myers as section chief in the technical service division.

D. C. Beevers, station superintendent of Bisti compressors in El Paso Natural Gas Co.'s San Juan, N. M., division, has been promoted to Aneth plant superintendent.

Charlie F. McKee, Tarpley, Tex., district foreman in Humble Pipe Line Co.'s Imogene, Tex., district, has retired after 32 years with the company.

Bryan E. Mitchell, Houston, has been elected vice president and a director of Pan American Gas Co., gas transmission subsidiary of Pan American Petroleum. Mitchell succeeds **E. A. Renfro,** who resigned to devote his time to his assignment as Gulf Coast division gas superintendent for Pan American Petroleum. Mitchell was recently named gas-development superintendent for the parent company's Gulf Coast division.

Wayne T. Corley has been named assistant manager of Humble Pipe Line Co.'s Midland, Tex., area. He will take over the post in late December after completing an assignment as general manager for construction of West Shore Pipe Line Co. in Indiana, Illinois, and Wisconsin. West Shore is jointly owned by Humble and nine other companies.

Karl Wehmeyer, Granville, Ohio, consulting geologist, has been elected president of the newly organized Ohio Geological Society. Other officers will be **Ralph Bernhagen,** Ohio State Geological Survey, first vice president; **Harold O. Smedley,** Skelly Oil Co., second vice president; and **Russell Payne,** Lake Shore Pipeline Co., secretary-treasurer.

Clarence Unnevehr, head of the gas and electric branch of the California Public Utilities Commission, has been appointed chief of Federal Power Commission's Bureau of Natural Gas. He succeeds **Carl T. Kallina,** who has resigned from the FPC post.

J. H. Gimlin, Gulf Coast division exploration manager for Sunray Mid-Continent Oil Co., has been appointed manager of land for the

GIMLIN

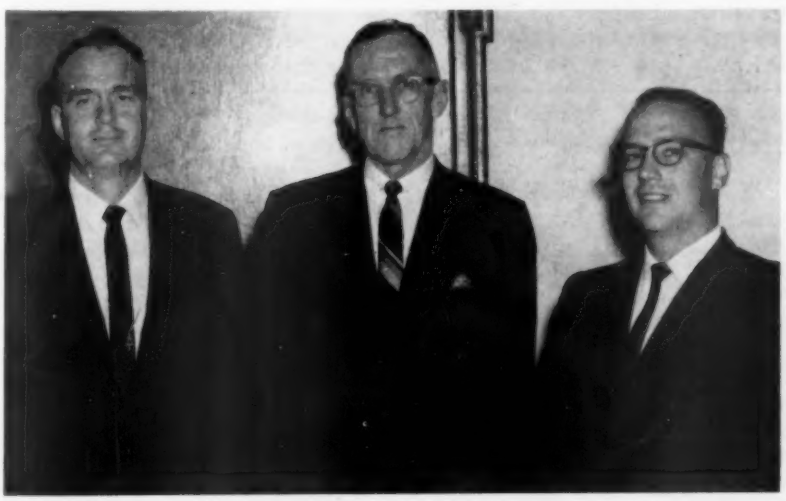
TIMM

company. He will headquarter in Tulsa. **Bert C. Timm,** manager of geology in Tulsa, will move to Houston to succeed Gimlin as division exploration manager. Gimlin succeeds **Ernest V. Potter,** recently named central division exploration manager in Oklahoma City. Gimlin has been with Sunray since 1951; Timm joined the company in 1950.

L. E. (Larry) Graham has been promoted to regional coordinator of reserves and production acquisitions for Continental Oil Co. in Los Angeles.

Don E. Lessly has joined Kewanee Oil Co. as a geologist at Denver. He formerly was with Sohio Petroleum Co. at Casper.

Ray C. Bartels, Glenrock, Wyo., district superintendent for Continental Oil Co., has retired after 40 years with the company.



NEW OFFICERS of Houston API chapter include, left to right, R. C. Shields, Texaco, second vice chairman; J. F. Hendrickson, Phillips Petroleum Co., chairman; and R. W. McMurry, Hydril Co., assistant secretary-treasurer. Not pictured are George H. Kimbrell, Oil Production Maintenance Co., secretary-treasurer; and Frank Zimmerman, Lion Oil Co., first vice chairman.

F. Walker Johnson has resigned as vice president of Jersey Production Research Co., Tulsa, to become deputy manager of the exploration division of the producing coordination department for Standard Oil Co. (N. J.). In his New York assignment, Johnson replaces **Vaughn C. Maley,** who has been appointed senior exploration adviser. Johnson has been Jersey Production vice president since 1958 when he transferred to the research company from Creole Petroleum Corp., Venezuela.

JOHNSON

Tidewater Oil Co. has transferred **Richard A. Nixon,** a geophysicist, from Midland, Tex., to New Orleans, La.

Dudley H. Cardwell, research geologist for Sun Oil Co., has been transferred to Pittsburgh from Charleston, W. Va.

F. K. Cadwell has been named president of UNOCO Trading Co., Ltd., Union Oil Co. of California foreign subsidiary, which has been reorganized to permit expansion. Cadwell will headquarter at the company's principal offices in Hong Kong. Other officers include **Charles F. Parker,** vice president; **D. C. Gregg,** secretary; and **W. R. Craig,** treasurer and comptroller. The company operates principally in the Orient.

W. A. Wycherley, staff assistant to the manager of exploration for California Oil Co.'s western division, Denver, has been named northwestern division geophysicist in Billings, Mont. He will move to Billings January 1 to succeed **J. S. Johnson,** who has been assigned to the California Co.'s geophysics-technical section in New Orleans. Also, **H. L. Ellinwood** has been named northwestern division geologist for Standard Oil Co. of Texas in Amarillo, Tex. **G. B. Baker** will succeed Ellinwood as Caloil district exploration superintendent in Bismarck, N. D. **Joseph W. Spencer** has been named senior geophysicist in Denver. In Caloil's refining department, **J. E. Hayden,** chief refining engineer of the El Paso, Tex., refinery, has been named chief engineer of the new Standard Oil Co. (Ky.) Pascagoula, Miss., refinery. **R. W. Ayer,** chief engineer at the Caloil Salt Lake City refinery, will succeed Hayden. **D. M. O'Neill,** assistant cracking division superintendent at the El Paso refinery, will succeed Ayer in Salt Lake City.

M. O. Graham, geophysicist with Humble, has been transferred to Billings, Mont., from Miles City, Mont.

T. C. Herman has joined Shell Oil Co. as junior exploitation engineer in Kilgore, Tex.

A. P. Bowsher, vice president and treasurer, Pacific Petroleums, Ltd., Calgary, has been elected a director of the company. **John Anderson,** who heads Pacific's legal department, has been named secretary.

Bobby G. Newton, division operations geologist for Pan American Petroleum Corp. in Casper, Wyo., has been appointed Casper district exploration superintendent. He succeeds **C. L. Walker** who will take over a staff position in the division office. Newton has been with Pan Am since 1952. He had been division operations geologist for the past year.

NEWTON

J. O. Sayre, United Fuel Gas Co., Charleston, W. Va., has been elected president of Appalachian Geological Society. Other new officers are **Wallace R. McCord,** West Virginia Geological Survey, Morgantown, vice president, northern area; **William N. Dudley, Jr.,** J. M. Huber Corp., St. Albans, W. Va., vice president, central area; **George R. Thomas,** United Fuel Gas, Paintsville, Ky., vice president, southern area; **Lloyd Jackson,** Pack & Jackson, Hamlin, W. Va., associate vice president; **Duane Beardsley,** United Carbon Co., Charleston, treasurer; **Carl E. Broshears,** Sun Oil Co., Charleston, secretary; and **William H. Henry,** Hope Natural Gas Co., Bridgeport, W. Va., editor.

O. R. Clements has been transferred by El Paso Natural Gas Products Co. from El Paso, Tex., to Odessa, Tex., where he will be operations supervisor, petrochemical development staff.

DEATHS

Walter W. Fondren, Jr., 53, president of Fondren Oil Co., died November 1 in Houston. He was the son of the late Walter W. Fondren, Sr., one of the founders of Humble Oil & Refining Co.

Warren J. Collins, 57, general counsel for Lone Star Gas Co. and its subsidiaries, died October 30 in a Dallas hospital after suffering a heart attack at his home. He had been with Lone Star since 1928.

Sherman R. Brumelle, 76, retired field superintendent for Bigheart Pipe Line Corp., died November 3 in a Tulsa hospital. Brumelle retired in 1959.

Joseph M. Kruse, 55, operations manager for Shell Oil Co.'s southeastern marketing division, died October 27 in Atlanta. He had been with Shell since 1926.

Gilbert John Syminton, 79, founder of a predecessor of Richfield Oil Corp., died November 4 in a Los Angeles hospital.

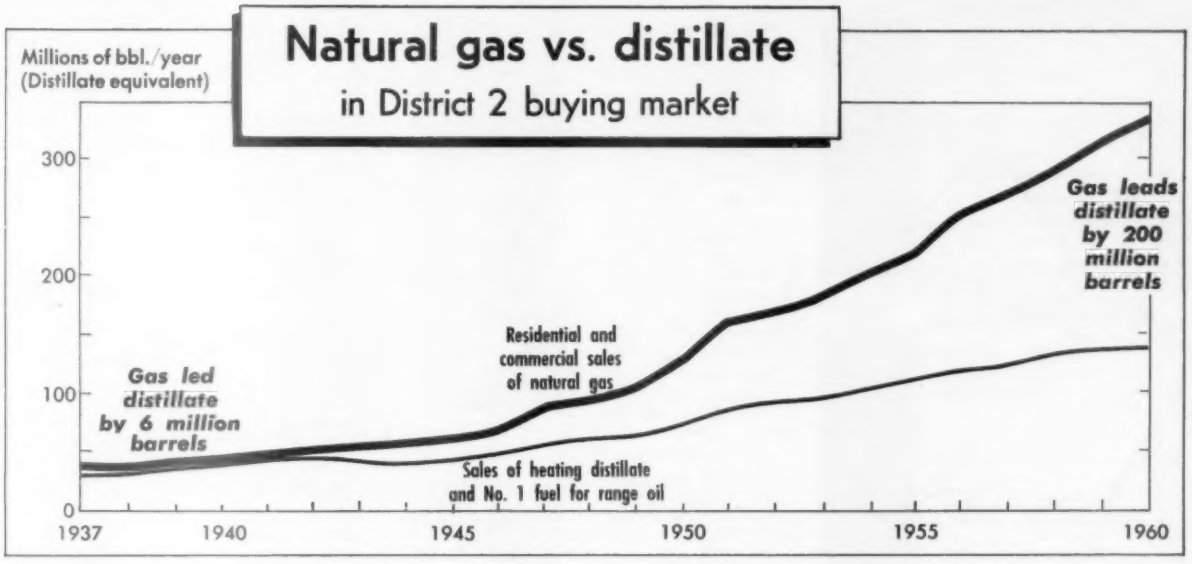
Gerald F. Duncan, 53, Big Spring, Tex., district superintendent for Continental Oil Co., died October 22.

George Earl Harris, Sr., 66, retired treasury department supervisor for Sunray Mid-Continent Oil Co., died October 30 in a Tulsa hospital. Harris retired in 1958 after 40 years with Sunray and its predecessors.

Basil E. Rogers, 65, Tulsa, retired secretary-treasurer of Herndon Drilling Co., died October 27.

Walter G. Flournoy, 47, Tulsa, driller for Kerr-McGee Oil Co., died October 27.

Glenn Cole, 62, Sapulpa, Okla., independent operator, died November 7 in a Sapulpa hospital.



District 2 is major fuel battleground

BY JOHN C. CASPER

ALMOST HALF of this country's residential and commercial sales of natural gas last year were to customers in District 2. In contrast, last year's sales of heating distillate in the district represented only 31.2% of the national total.

This district, which includes 15 states in central and north central sections of the country, is a prime market for both gas and distillates. It has been one of the hot areas of competition between distillate and natural gas since the late thirties, and it has been an important gas-consuming area since the turn of the century.

District 2 became an early user of natural gas because a large part of total gas production was within the district. As early as 1906, District 2 accounted for 53% of total gas production. These were the days before large, high-pressure transmission lines, and gas was marketed closer to producing fields. West Virginia produced as much marketed gas as Texas as late as 1926, and Oklahoma was the top producing state in 1928.

Gas has had another rapid expansion period in District 2 since the end of World War II. The chart pictures competition for the heating market in the district with gas and distillate as chief rivals. For comparison, sales of natural gas are expressed as distillate equivalent. Both curves are in millions of barrels per year.

Back in 1940, gas and distillate were about equal contenders for the heating market in District 2. Gas was leading by only about 6 million barrels. By 1960, gas sales were ahead 200 million barrels.

District 2 remains a prime market for both gas and distillate fuel. The high percentage of urban population cuts distribution costs for gas and offers some reduction in cost of distillate deliveries.

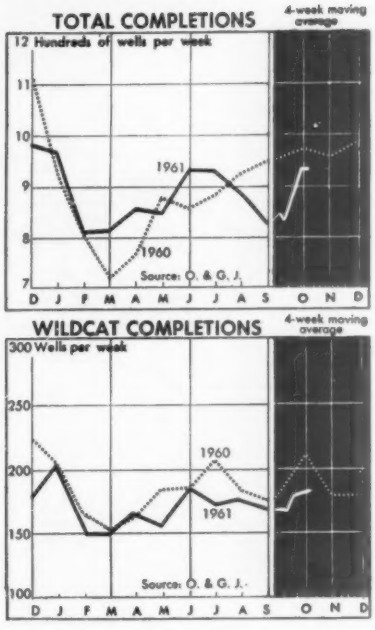
Almost 34% of all people in the United States live in District 2, and 51% of the district's population is in cities and towns of 2,500 and over. Cities with populations over 50,000 number about 100. Good potential markets and increasing supplies add up to a continuing scrap for the heating market in this area.

If price becomes the chief market weapon, oil and gas profits will be even skimpier in the sixties.

A quick look at the highlights . . .

	LATEST WEEK	Change from WEEK AGO		Change from YEAR AGO	
Production	7,141,100	UP	8,770	UP	30,392
Crude stocks	251,148,000	UP	542,000	UP	20,339,000
Completions	929	DOWN	54	DOWN	93
Refinery runs	7,834,000	DOWN	312,000	UP	4,000
Gasoline stocks	183,418,000	UP	240,000	DOWN	932,000
Kerosine stocks	37,049,000	UP	213,000	UP	304,000
Distillate stocks	179,000,000	UP	1,909,000	DOWN	1,453,000
Residual stocks	448,702,000	DOWN	1,238,000	DOWN	377,000
Four-product stocks	448,169,000	UP	1,124,000	DOWN	2,458,000
Total imports	1,762,400	UP	127,200	UP	64,900

Drilling



Active rotary rigs

	11-6-61	10-30-61	11-7-60
Alabama	6	6	3
Alaska	6	11	7
Arkansas	20	18	14
Arizona	3	3	2
California	106	96	70
Land	101	93	67
Offshore	5	3	3
Colorado	28	27	50
Florida	1	1	3
Land	0	0	2
Offshore	1	1	1
Georgia	0	0	2
Illinois	47	40	46
Indiana	8	7	8
Iowa	0	1	1
Kansas	106	112	99
Kentucky	7	9	6
Louisiana	277	264	265
North	48	38	32
S. Inland waters	106	99	105
S. Land	72	75	73
Offshore	51	52	55
Michigan	23	20	29
Mississippi	58	69	58
Missouri	2	2	2
Montana	30	21	25
Nebraska	27	21	19
Nevada	0	1	0
New Mexico	99	104	100
New York	2	2	2
North Carolina	0	1	15
North Dakota	13	12	6
Ohio	9	7	168
Oklahoma	198	187	0
Pennsylvania	6	5	10
South Dakota	1	1	1
Texas	673	653	611
S. Inland waters	13	12	12
S. Land	196	187	151
Offshore	1	0	2
North	60	57	38
Panhandle	46	46	58
East	69	65	53
West Central	169	164	172
West	119	122	125
Utah	42	43	29
Washington	0	0	1
West Virginia	12	12	9
Wisconsin	0	0	1
Wyoming	69	64	70
Total U. S.	**1,879**	1,820	1,732
Cum. avg. to date	1,732	1,728	1,733
Western Canada	138	144	139
Eastern Canada	1	1	0
Grand total	2,018	1,965	1,871

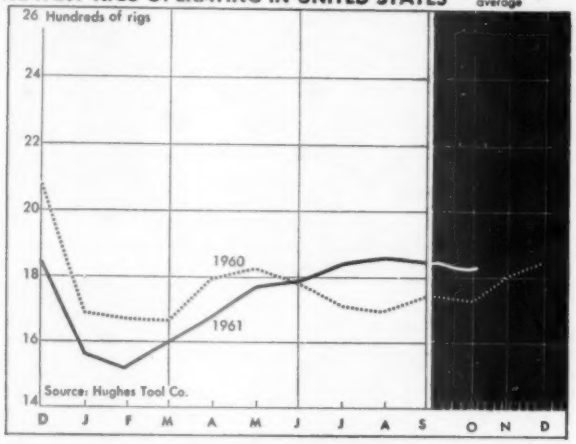
Hughes Tool Co. report.

Weekly well completions . . . Week ended November 4, 1961

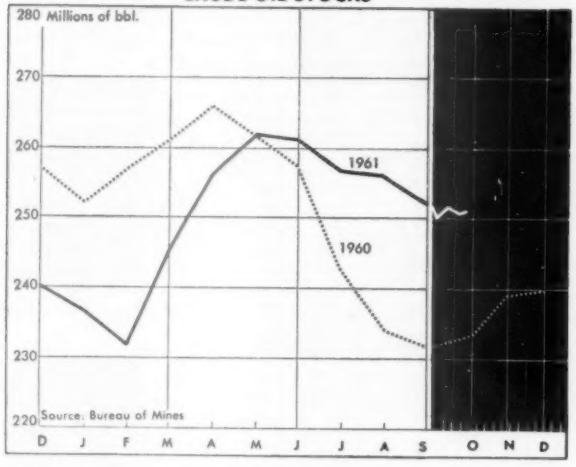
	Total wells							Cum.		Total wildcats					Cum.	
	Total	Crude	Cond.	Gas	Dry	Service	Footage	1961	1960	Total	Crude	Cond.	Gas	Dry	1961	1960
Arkansas	10	7	0	1	2	0	42,663	433	518	1	0	0	0	1	91	131
California	45	30	0	5	10	0	212,192	1,526	1,426	5	0	0	0	5	229	259
Colorado	23	3	1	4	15	0	111,629	563	549	7	1	1	1	4	251	278
Illinois	34	14	0	0	20	0	81,976	1,739	1,948	9	1	0	0	8	391	411
Indiana	24	10	0	0	14	0	42,822	651	906	7	1	0	0	6	177	327
Kansas	71	27	0	8	35	1	271,935	4,089	3,419	13	1	0	2	10	749	889
Kentucky	13	4	0	0	9	0	14,621	1,582	1,806	4	1	0	0	3	109	191
Louisiana	91	41	0	14	36	0	642,547	3,236	3,058	9	0	0	0	9	539	476
North	47	19	0	8	20	0	183,436	1,361	1,169	5	0	0	0	5	256	228
South	33	16	0	4	13	0	343,952	1,419	1,469	2	0	0	0	2	234	220
Offshore	11	6	0	2	3	0	115,159	456	420	2	0	0	0	2	49	28
Michigan	17	0	0	0	11	6	48,313	671	805	5	0	0	0	5	243	218
Mississippi	18	6	0	2	10	0	186,349	465	581	11	3	0	0	8	169	225
Montana	3	1	0	0	2	0	13,703	331	283	1	0	0	0	1	158	131
Nebraska	14	4	0	0	10	0	63,358	827	752	7	0	0	0	7	410	324
New Mexico	40	13	0	10	17	0	213,569	1,547	1,589	9	0	0	0	9	255	222
West	15	1	0	10	4	0	72,839	672	568	3	0	0	0	3	83	62
East	25	12	0	0	13	0	140,730	875	1,021	6	0	0	0	6	172	160
North Dakota	7	3	0	0	4	0	31,323	217	252	2	0	0	0	2	60	70
Ohio	20	14	0	2	4	0	37,794	897	916	0	0	0	0	0	36	44
Oklahoma	148	71	1	10	30	36	412,036	4,904	3,925	10	0	1	2	7	456	606
Texas	281	134	0	25	117	5	1,268,254	12,141	13,289	94	9	0	6	79	2,614	2,728
District 1	26	19	0	0	7	0	72,325	786	944	6	1	0	0	5	311	341
District 2	11	1	0	4	6	0	82,811	633	649	4	0	0	0	4	191	161
District 3	29	12	0	9	8	0	214,465	964	1,007	10	1	0	3	6	194	188
District 4	28	5	0	5	18	0	96,538	1,033	902	17	1	0	1	15	281	253
East	23	12	0	0	11	0	134,965	983	1,097	8	1	0	0	7	258	227
District 7-B	37	16	0	0	21	0	92,016	1,509	1,894	17	2	0	0	15	425	534
West	70	44	0	3	19	4	363,047	3,036	3,404	19	2	0	1	16	602	534
District 9	38	16	0	1	20	1	103,895	2,207	2,489	6	0	0	0	6	243	440
District 10	19	9	0	3	7	0	108,192	990	903	7	1	0	1	5	109	50
Utah	3	1	0	0	2	0	15,131	206	199	2	0	0	0	2	94	73
West Virginia	24	3	0	20	1	0	55,753	840	744	0	0	0	0	0	7	8
Wyoming	17	5	0	2	10	0	83,745	817	900	8	1	0	0	7	313	364
Miscellaneous*	26	14	0	1	1	10	53,079	1,216	1,110	1	0	0	0	1	237	209
Total U. S.	**929**	405	2	104	360	58	3,902,792	38,898	38,975	**205**	18	2	11	174	7,588	8,184
Previous week	983	414	5	134	314	116	4,154,972			165	10	2	8	145		
Cum. 1961	38,898	17,424	708	3,990	14,102	2,674	158,282,323			7,588	669	81	346	6,492		
Cum. 1960	38,975	17,590	1,130	3,251	14,819	2,185	161,111,726			8,184	742	88	273	7,081		
Western Canada	65	41	0	6	18	0	371,581	1,919	1,966	10	0	0	1	9	452	515

*New York, Washington, Alaska.

ROTARY RIGS OPERATING IN UNITED STATES 4-week moving average



CRUDE-OIL STOCKS



Crude-oil stocks by states of origin*

(Thousands of barrels)

	10-28-61	10-21-61	10-29-60
Pennsylvania	2,307	2,337	2,280
Other Appalachian	1,573	1,478	1,473
Illinois, Indiana, Michigan	9,622	9,350	8,869
Nebraska and North Dakota	3,046	3,159	2,605
Kansas	9,233	9,237	8,420
Oklahoma	16,791	16,481	14,652
Arkansas	1,696	1,538	1,696
Louisiana	19,702	20,887	18,207
North	3,093	3,350	2,905
South	16,609	17,537	15,302
Mississippi, Alabama, Florida	3,583	4,012	1,861
New Mexico	9,103	9,101	8,361
Texas	107,829	107,137	98,081
East Texas	8,015	8,151	7,608
West Texas	48,535	48,303	47,670
Texas Gulf	19,163	18,125	16,589
Other Texas	32,116	32,558	26,214
Wyoming	16,213	16,425	14,978
Other Rocky Mountain	10,281	9,817	9,792
California	24,009	24,525	25,911
Foreign	†16,160	15,122	13,623
Total	**251,148**	250,606	230,809

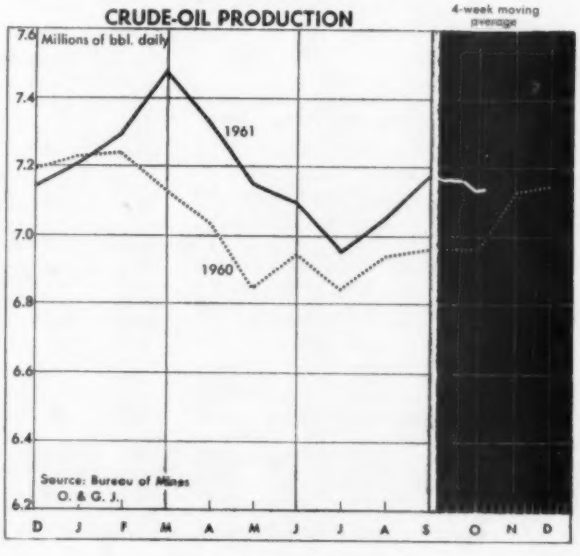
*Bureau of Mines. †Includes 5,335,000 bbl. in California.

Daily average production for week

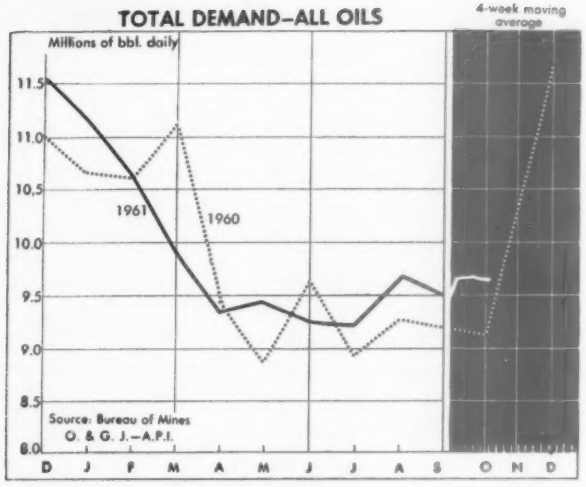
	November 4, 1961 Crude oil	Lease condensate	Total	Oct. 28 total
Alabama	17,100	.....	17,100	17,000
Alaska	23,000	.....	23,000	23,600
Arkansas	74,050	125	74,175	74,150
California	816,300	.....	816,300	815,100
Colorado	127,000	.....	127,000	127,900
Eastern	40,200	.....	40,200	40,900
Florida	950	.....	950	900
Illinois	213,600	.....	213,600	216,200
Indiana	31,100	.....	31,100	31,200
Kansas	†309,025	.....	†309,025	†310,955
Kentucky	51,800	.....	51,800	51,700
Louisiana	1,035,300	165,750	1,201,050	1,184,325
North	101,375	6,225	107,600	107,500
South	933,925	159,525	1,093,450	1,076,825
Michigan	52,500	.....	52,500	52,500
Mississippi	146,000	4,200	150,200	150,100
Montana	86,600	.....	86,600	88,400
Nebraska	69,800	.....	69,800	71,400
Nevada	400	.....	400	400
New Mexico	308,850	9,000	317,850	315,500
North Dakota	59,200	.....	59,200	62,100
Oklahoma	†491,400	.....	†491,400	†505,800
Texas	2,415,700	93,800	2,509,500	2,497,000
Dist. 1	43,000	2,900	45,900	45,800
Dist. 2	104,275	8,000	112,275	111,000
Dist. 3	305,425	38,000	343,425	343,000
Dist. 4	176,425	14,000	190,425	189,500
Dist. 5	26,000	850	26,850	26,700
Dist. 6	115,850	8,500	124,350	123,500
East Texas field	126,850	.....	126,850	126,000
Dist. 7-B	122,850	500	123,350	125,450
Dist. 7-C	106,425	3,550	109,975	109,550
Dist. 8	988,575	13,000	1,001,575	992,000
Dist. 9	194,450	2,500	196,950	196,500
Dist. 10	105,575	2,000	107,575	108,000
Utah	92,500	.....	92,500	91,600
Wyoming	405,200	.....	405,200	403,000
Others	‡650	.....	‡650	‡600
Total U. S.	6,868,225	272,875	7,141,100	7,132,330
Change from prev week, up			**8,770**	
Canada	†561,700	†18,300	†580,000	†643,900
Total U. S. prod.—Jan. 1-Nov. 4			§2,214,667,400 bbl.	
Same period last year (crude plus cond.)			*2,167,730,800 bbl.	

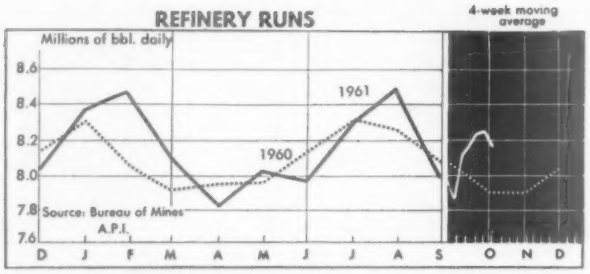
*Includes 69,669,100 bbl. condensate. †Week ended previous Monday. ‡South Dakota and Arizona. §Revised.

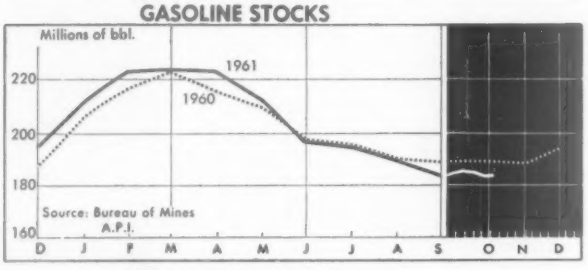
CRUDE-OIL PRODUCTION 4-week moving average

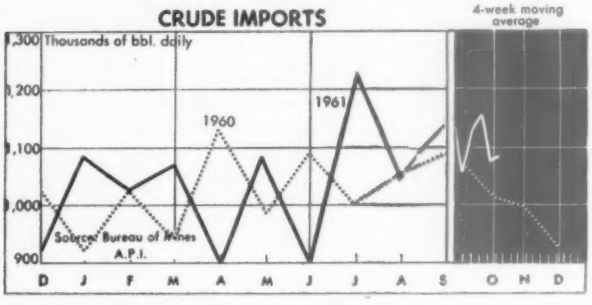


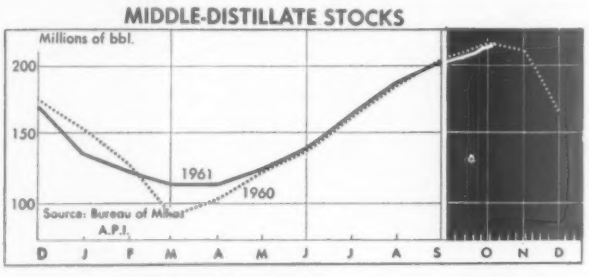
Refining

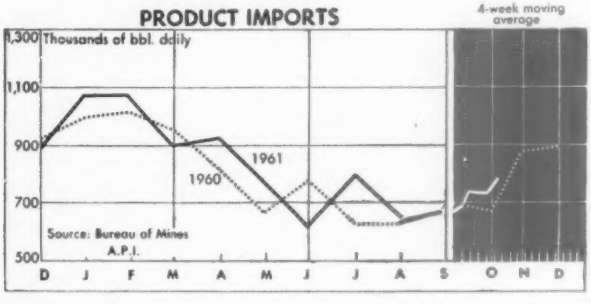


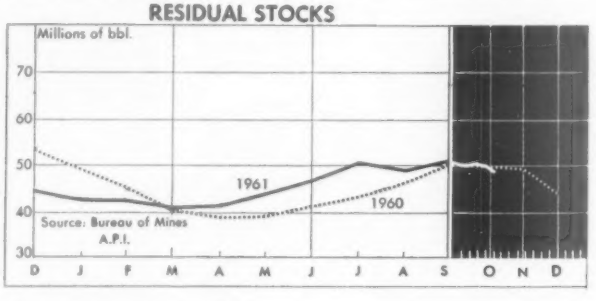












API refinery report—November 3, 1961

(Thousands of barrels)

District—	Daily avg. runs	Daily average production Gaso.*	Kero.	Dist.	Resid.	Stocks‡ Gaso.†	Kero.	Dist.	Resid.	Bureau of Mines, November 1960 Daily avg. runs	Daily average production Gaso.*	Kero.	Dist.	Resid.
East Coast	1,030	470.9	31.0	344.1	134.0	43,599	14,822	72,551	13,339	1,062	503.8	34.1	332.7	145.4
Appalachian:														
District 1	105	49.6	5.4	24.0	12.3	5,749	835	4,427	384	98	39.9	4.1	19.9	11.8
District 2	87	46.3	7.4	15.7	7.3	3,231	505	1,735	222	102	52.7	7.2	18.7	12.4
Ind., Ill., Ky.	1,580	774.9	81.4	361.1	148.2	31,180	7,532	31,573	5,729	1,429	735.5	80.4	313.5	167.4
Minn., Wis., Dak.	125	59.6	3.7	28.7	11.9	6,407	1,928	9,134	654	115	55.0	5.3	27.1	22.0
Okla., Kans., Mo.	656	372.9	11.0	184.3	12.4	15,809	1,773	13,099	945	706	410.9	11.0	176.5	19.3
Inland Texas	304	216.4	9.4	52.0	21.7	7,099	634	1,571	2,816	274	214.6	9.7	45.3	18.7
Texas Gulf Coast	1,662	956.7	133.4	453.7	128.0	23,914	3,381	17,377	5,455	1,881	968.9	140.1	457.8	135.7
La. Gulf Coast	725	351.1	63.0	166.6	30.4	9,297	1,805	7,370	1,167	645	358.7	73.0	143.5	39.9
N. La. and Ark.	110	63.1	5.7	23.7	6.1	6,517	953	2,639	201	108	68.2	5.8	21.4	7.3
Rocky Mountain:														
New Mexico	28	15.4	0.4	5.0	2.7	763	44	240	94	22	11.7	0.3	3.9	2.7
Other Rocky Mt.	242	118.6	6.3	55.9	27.0	5,086	653	2,708	1,165	280	140.9	3.5	67.7	33.6
West Coast	1,180	521.1	41.9	214.3	243.6	24,767	2,184	14,576	16,531	1,171	527.9	38.9	201.3	287.6
Nov. 3, 1961	7,834	4,016.6	400.0	1,929.1	785.6	183,418	37,049	179,000	48,702	7,893	4,088.7	413.4	1,829.3	903.8
Oct. 27, 1961	8,146	4,138.7	420.3	1,923.1	801.7	183,178	36,836	177,091	49,940	.....	.....	.....	.....	.....
Nov. 4, 1960	7,830	3,969.3	426.9	1,766.0	842.4	184,350	36,745	180,453	49,079	.....	.....	.....	.....	.....

*At refineries including natural blended. †Finished and unfinished. ‡At refineries, bulk terminals, in transit, and in pipelines.

CRUDE-OIL PRICES

Gravity schedule

	Signal Hill, Calif.	Oklahoma	West Tex. (sour)	West Tex. (inter.)	No.* Texas	Texas Refugio Light	Bayou Sale (La.)	Denver-Julesburg	Wyo. (sour)
14-14.9	$1.86								
15-15.9	1.93								$1.81
16-16.9	2.00								1.86
17-17.9	2.06								1.91
18-18.9	2.13								1.96
19-19.9	2.20								2.01
20-20.9	2.27	$2.49	†$2.35	$2.61	$2.29	$2.95	$2.90	‡$2.38	2.06
21-21.9	2.33	2.52	2.38	2.63	2.33	2.97	2.92	2.40	2.11
22-22.9	2.40	2.55	2.41	2.65	2.37	2.99	2.94	2.42	2.16
23-23.9	2.46	2.58	2.44	2.67	2.41	3.01	2.96	2.44	2.21
24-24.9	2.53	2.61	2.47	2.69	2.45	3.03	2.98	2.46	2.26
25-25.9	2.60	2.64	2.50	2.71	2.49	3.05	3.00	2.48	2.31
26-26.9	2.67	2.67	2.53	2.73	2.53	3.07	3.02	2.50	2.36
27-27.9	2.74	2.70	2.56	2.75	2.57	3.09	3.04	2.52	2.49
28-28.9	2.81	2.73	2.59	2.77	2.61	3.11	3.06	2.54	2.54
29-29.9	2.87	2.76	2.62	2.79	2.65	3.13	3.08	2.56	2.59
30-30.9	2.93	2.79	2.65	2.81	2.69	3.15	3.10	2.58	2.63
31-31.9	3.00	2.82	2.68	2.83	2.73	3.17	3.12	2.60	2.67
32-32.9	3.06	2.85	2.71	2.85	2.77	3.19	3.14	2.62	2.71
33-33.9	3.12	2.88	2.74	2.87	2.81	3.21	3.16	2.64	2.75
34-34.9	3.17	2.91	2.77	2.89	2.85	3.23	3.18	2.66	2.79
35-35.9	3.22	2.94	2.80	2.91	2.89	3.25	3.20	2.68	2.83
36-36.9	3.27	2.97	2.83	2.93	2.93	3.27	3.22	2.70	2.87
37-37.9	3.31	2.99	2.86	2.95	2.95	3.29	3.24	2.72	2.89
38-38.9		3.01	2.89	2.97	2.97	3.31	3.26	2.74	2.91
39-39.9		3.03	2.92	2.99	2.99	3.33	3.28	2.76	2.93
40-44.9		3.05	2.95	3.01	3.01	3.35	3.30	2.78	2.95

*Cooke, Grayson, Montague. †Other posting starts at $2.55. ‡Some at 2.58.

FLAT PRICES

Louisiana:	
Sweet Lake	$3.00
Texas:	
East Texas	3.10-3.25
Conroe	3.23-3.53
Van	2.93-3.08
Pennsylvania Grade:	
Bradford	$4.80
Middle District	4.52
Southwest Pennsylvania	4.25
West Virginia	4.17
Buckeye Grade	4.08
Illinois Basin	**3.00**

FOREIGN

Middle East, Persian Gulf: (cargoes f.o.b. lifting port)	
Arabian, 34.0°-34.9°, Ras Tanura	$1.80
Iranian, 34.0°-34,9°, Bandar Mashur	1.78
Iranian, 34.0°-34.9°, Abadan	1.73
Iraq, 35.0°-35.9°, Fao	
Kuwait, 31.0°-31.9°, Mina-al-Ahmadi	1.59
Qatar, 41°-41.9°, Umm said	1.95
Middle East, E. Mediterranean:	
Arabian, 34.0°-34.9°, Sidon	$2.17
Iraq, Mosul-Kirkuk, 35.0°-35.9°, Tripoli	2.19
Far East (cargoes, f.o.b. Lutong, Sarawak):	
Seria Light, 36°	2.42
Canada:	
Leduc-Woodbend	$2.63
Redwater (Alta.)	2.52
Weyburn (light)	2.185
Midale C	1.89
Venezuela:	
Cumarebo, 47°-47.9°, Tucupido	3.34
San Joaquin, 40°-40.9°, Puerto La Cruz	3.08
Oficina, 35°-35.9°, Puerto La Cruz	2.80
Tia Juana medium, 26°-26.9°, Amuay*	2.30
Quiriquire, 16.0°-16.4°, Caripito	2.10
Lagunillas heavy, flat, Las Piedras*	2.10
Bachaquero, flat, 15°-16°, Las Piedras*	1.88

Price for all crudes of 24° or lighter vary 2 cents per degree change, up or down. All crudes heavier than 24° vary 2.5 cents per half-degree gravity change.

*Also available at La Salina at 3 cents per barrel less.

TANKER RATES (Long ton)

(Latest reported spot fixtures)

★ Gulf-NY, clean (ATRS Flat)	$2.85
★ Gulf-NY, dirty (ATRS—30%)	2.00
★ Carib.-NY, dirty (ATRS—35%)	1.79
★ Carib.-UK, dirty (Scale—47.5%) (17s. 1d.)	2.39
★ PG-Japan, dirty (USMC—67.5%)	3.32

★ Denotes change from previous week.

REFINED PRODUCTS

Following quotations are realistic spot prices for refined products moving interstate on Wednesday each week. They may differ from refinenrs' posted prices and should not be considered as postings.

Light-product prices are in cents per gallon. Residual and crude prices are dollars per barrel. Crude prices are at the well unless otherwise listed.

GASOLINE*

Mid-Continent (Group 3):	
★ Regular (91 octane)	10.25-10.50
★ Premium (99 octane)	13.00-13.25
Natural gasoline (26-70)	4.5
Breckenridge	4.0
Gulf Coast (cargoes for coastwise or export movements):	
Regular (90 octane)	10.50-11.00
Regular (92 octane)	10.75-11.25
Premium (98 octane)	11.75-12.25
California (rack) Los Angeles:	
Regular (90 octane)	11.20
Premium (94 octane)	12.20
Premium (100 octane)	13.35
Caribbean area (cargoes):	
Regular (87 octane)	9.00
Premium (97 octane)	11.50

*Quotations are for octanes shown. Prices usually vary with octane ratings within the regular, premium, and aviation grades.

KEROSINE AND DISTILLATE

Mid-Continent (Group 3):	
Kerosine 42-44	9.50-9.75
Diesel oil (58 d.i. and above)	9.00-9.25
Distillate No. 1	9.00-9.25
Distillate No. 2	8.25-8.50
Gulf Coast (cargoes):	
Kerosine 41-43	9.50
Distillate No. 2	8.50
New York Harbor (barges):	
Kerosine 42-43	11.20
Distillate No. 2	10.20
Diesel fuel, 48-52 d.i.	10.35
Caribbean area (cargoes):	
Distillate No. 2	8.10

RESIDUAL FUEL

Mid-Continent (Group 3):	
Residual fuel (max. 1% S)	$1.65-1.75
Gulf Coast (cargoes):	
Bunker C fuel	2.20
New York Harbor (barges):	
Bunker C fuel	2.52
Caribbean (cargoes):	
Bunker C fuel	2.00
California (rack):	
Bunker C fuel, Los Angeles	2.25

Selected monthly data

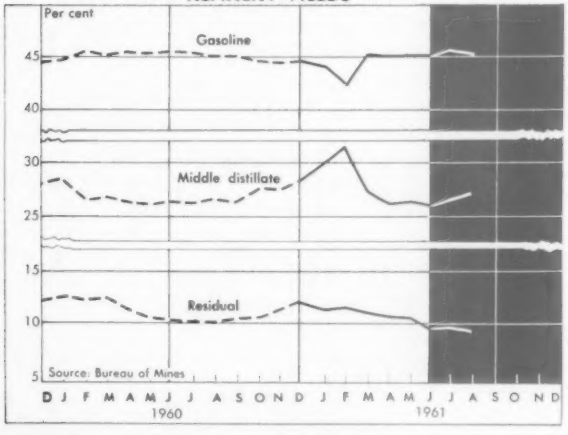
SUPPLY AND DEMAND—PRODUCTS

(Thousands of barrels daily)

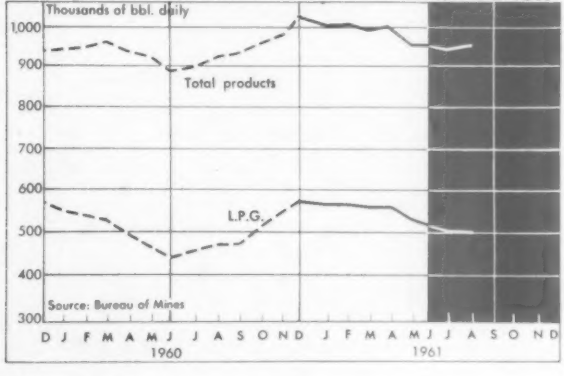
	Total demand	Refinery production	Stocks end of period†
Gasoline			
October 1961*	4,240	4,130	183,300
September 1961*	4,410	4,110	184,000
August 1961	4,553	4,335	191,597
November 1960	4,187	4,089	188,726
October 1960	4,109	4,033	189,674
Kerosine			
October 1961*	390	410	37,000
September 1961*	330	390	35,900
August 1961	328	365	33,929
November 1960	426	413	36,722
October 1960	252	387	36,547
Distillate			
October 1961*	1,570	1,930	178,500
September 1961*	1,390	1,855	167,200
August 1961	1,328	1,974	150,893
November 1960	2,070	1,829	173,913
October 1960	1,475	1,815	180,071
Residual			
October 1961*	1,440	810	49,100
September 1961*	1,300	830	50,300
August 1961	1,284	813	48,771
November 1960	1,660	904	49,525
October 1960	1,359	831	50,003

*Preliminary. †Thousands of barrels.

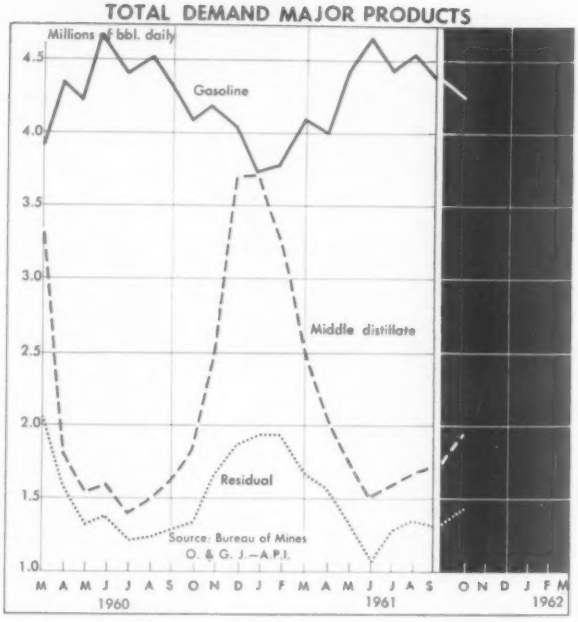
REFINERY YIELDS



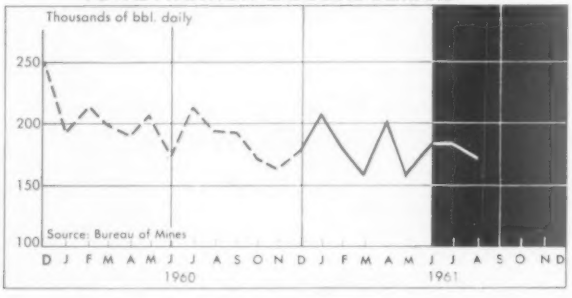
NATURAL GASOLINE AND CYCLING-PLANT PRODUCTION



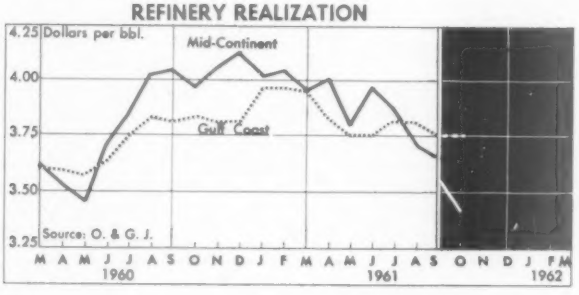
TOTAL DEMAND MAJOR PRODUCTS


Millions of bbl. daily
Gasoline
Middle distillate
Residual
Source: Bureau of Mines
O. & G. J.—A.P.I.
M A M J J A S O N D J F M A M J J A S O N D J F M
1960
1961
1962

TOTAL AVIATION GASOLINE DEMAND



REFINERY REALIZATION



REFINERY REALIZATION

	Oct.*	Sept.*	Aug.	July
Mid-Continent	$3.41	÷$3.55	$3.67	$3.87
Gulf Coast	3.75	3.75	3.81	3.81

*Preliminary. Refinery realization is based on yields of major products and average spot prices of regular gasoline, kerosine, No. 2 fuel and residual as published in The Oil and Gas Journal. †Revised.

New Management Textbooks

FOR YOUR WORKING LIBRARY

Here is your chance to make additions to your library of new management texts. These books are not published by The Oil and Gas Journal, but are offered to you through the Reader Service Department. Look the list over, pick out those that you want and send your order on the blank provided.

"TOP MANAGEMENT HANDBOOK"
H. B. Maynard (1960) **$17.50**

Presents a shirt-sleeves aproach to such factors as getting the most from your time—incentives—promoting innovation—planning—securities markets. Explores executive responsibilities in sales, production, finance, research, and personnel. 1,236 pages. 146 illustrations.

"TOP-MANAGEMENT ORGANIZATION AND CONTROL"
Paul E. Holden, L. S. Fish, H. L. Smith (1951) . . . **$6.00**

Covers staff organization—control over rate of operation—control over salaries—control over line of products—control over quality of key personnel—reports to the board—proceedure of the board. 257 pages.

"EXECUTIVE'S GUIDE TO BUSINESS PROCEEDURES"
Sydney Prerau (1960) **$4.95**

Enables you to check every step you should take in organizing and reorganizing a business—developing good public, customer, stockholder relations—controlling salesmen's expenses—planning office layout—financing and borrowing— accounting control—budgeting for profit—cost systems and many others. 256 pages.

"HOW TO BE A MORE CREATIVE EXECUTIVE"
Joseph G. Mason (1960) **$5.95**

This how-to-do-it book brings you step-by-step coverage on all aspects of imaginative problem solving, from a defination of creative thought . . . through the objectives and characteristics of effective idea-producing groups . . . to a description of the creative executive in action. 281 pages.

"BUSINESS MANAGEMENT HANDBOOK"
Sydney Prerau (Second edition, 1960) **$12.50**

Dependable facts on every phase of modern business management. How to set up a business and run it. How to get your product on the right market. How to halt personnel turnover. How to build better employee and customer relations. How to get the most out of your insurance money. And many others. 842 pages.

"HOW TO BUILD JOB ENTHUSIASM"
Edward J. Hegarty (1960) **$5.95**

19 important chapters presenting tools and suggestions on how to build job enthusiasm and how to sell these ideas to your employees. 251 pages.

"PUBLIC RELATIONS AND MANAGEMENT"
David Finn (1960) **$4.50**

This book presents a realistic view of what public relations can and cannot do for a company and tells why. 189 pages.

"HANDBOOK OF INDUSTRIAL RESEARCH MANAGEMENT"
Carl Heyel (1959) **$12.00**

This book brings together in one volume the best practice in the organization, evaluation and control of industrial research. Here is a clarification of the management function. Includes complete coverage of management perspectives, research operations, control and evaluation, accounting and others. 531 pages.

"ORGANIZING THE TECHNICAL CONFERENCE"
Herbert S. Kindler (1960) **$6.00**

Answers completely the questions of when to initiate, and how to plan, organize and conduct effective technical conferences, whether large or small. Programming — promoting — documenting — administering —evaluating. 151 pages.

"CREATIVE THINKING"
Charles W. Whiting (1958) **$3.95**

Explains workable methods for the stimulation of new ideas. Includes detailed descriptions of actual ways to begin the creative process. Many examples of successful creative training programs are described.

"BETTER REPORT WRITING"
Willis H. Waldo (1957) **$4.75**

This handy desk guide presents authoritative facts on the important details of effective scientific composition, style, division of reports, tables, illustrations, and use of words. Three appendices condense a vast amount of information on abbreviations, symbols, and hyphenation.

Title of Book	Price
	$
	$
	$
	$
Total of Order	$

. . . . Payment enclosed . . . . Purchase order enclosed . . . . Mail invoice
(Make Checks payable to The Oil and Gas Journal)

Name . . . . . .

Address . . . . . .

City . . . . . Zone . . . State . . . . . .

Reader Service Department
THE OIL AND GAS JOURNAL
P. O. Box 1260 Tulsa 1, Okla.

CLASSIFIED ADVERTISING

. . . your market place for the oil and gas industry

RATES:

- UNDISPLAYED CLASSIFIED: 30c a word per issue. 10% discount for three or more consecutive issues. $5.00 minimum charge. Blind box in care count nine extra words. Not subject agency commission.
- DISPLAYED CLASSIFIED: $20 a column inch one issue, 10% discount three or more consecutive issues. Minimum size one inch. Subject to agency commission.
- All classified payable in advance.
- DEADLINE: Copy to reach The Oil and Gas Journal not later than 9 a. m. on Wednesday preceding date of publication. Send advertisements to: Classified Advertising Manager, THE OIL AND GAS JOURNAL, P. O. Box 1260, Tulsa 1, Oklahoma.

EXCEPT . . .

WESTERN STATES: (California, Washington, Oregon, Idaho, Nevada, Utah, and Arizona). Write: Classified Departments, Inc. The Oil and Gas Journal, 4041 Marlton Ave., Los Angeles 8, Calif. Phone AXminister 2-0287. Copy deadline Monday noon.

FOR SALE EQUIPMENT

20,000 FEET 4½" O.D. used 10.79# double random pipe, PE and beveled for welding, tested 1000#, priced reasonable. Call CE 5-1454, Oklahoma City, collect.

R L CARDWELL double drum spudder—GKU power with 93' derrick. Ready to work—bargain—will trade for casing or tubing. Call collect CE 5-1454 Oklahoma City.

4—53/4" x 50' and 1—4½" x 50' core barrels with all spare parts and equipment. All equipment in excellent condition. Box M-630, The Oil and Gas Journal, Tulsa, Okla.

2500 FAILING, 58' mast, 58' derrick for 200 Sullivan 5x8 pump on skids. Fred Butler, Box 481, Pueblo, Colo.

AN INVESTMENT! Productive advertising is an investment rather than an expenditure. Experienced oil men have found that The Oil and Gas Journal is their best classified advertising medium.

SALE OR LEASE 1—48 and 1—36L Bucyrus Erie Spudders, purchased new 1954. Keta Gas & Oil Co. Box 250. Bradford, Penna.

PUMPING UNIT, American-Type 554-356 Floor Clearing, 74" Stroke, with 8¼ x 9" Weber Type 2-MC-50 HP. 2 Cyl. Vertical Gas Engine, located near Lisbon, Louisiana. Arnold Pipe & Supply Co., 3815 Greenwood Rd., Shreveport, Louisiana.

THREE SURFACE Combustion Corp., Special GFH-DX combustion generating units, 16,330 CFH, capacity, natural gas 2040 cu. ft./hour, air 20400 pressure 24-oz. with accessories. Alfred B. Kern, 305 Kennedy Bldg., Tulsa, Oklahoma.

Parkersburg Type 100-G-320-D-28-N-11 air balanced pumping unit W/8½ x 10 CMA Ajax Eng. with starter.

30" x 10' and 13' 125# WP Vert O & G Separators with fittings. All A-1 Cond.

Midwest Pipe & Supply Co.
Oklahoma City, Okla.

LIQUIDATION

at ESSO REFINERY Balto., Md.

MOST EQUIPMENT NEW 1956

TOWERS	• COMPRESSORS
DRUMS	• BLOWERS
FURNACES	• TRANSFORMERS
PUMPS	• MOTORS
CONDENSERS	• FURNACE TUBES

WRITE FOR CATALOG

HEAT & POWER CO., INC.
60 East 42nd St., New York 17, N. Y.
310 Thompson Bldg., Tulsa, Okla.

FOR SALE EQUIPMENT

USED DRILLING Derrick and substructure 30' x 30' x 140' Lee C. Moore Single Well Galvanized Derrick 1,100,000# and 100 MPH Wind Capacities. 30' base, truss type API Galvanized Substructure. The California Company, 1111 Tulane Avenue, New Orleans 12, Louisiana.

PUMPING UNIT, Emsco—228,000# Gear—24,200# Beam, 64" Stroke, with Ajax 12 x 15 Gas Engine, located near Magnolia, Arkansas. Arnold Pipe & Supply Co., 3815 Greenwood Rd., Shreveport, Louisiana.

50,000 FT. 20 inch No. 1 grade used pipe. Lengths 20 ft. square cut ends. Weight 78# to the ft. High Tensile Pipe. Indiana-Ohio Pipe Co., P. O. Box 5462 Shep. Sta., Columbus 19, Ohio. Phone CL 3-5527—CL 3-5528.

1-Super 38 Wilson double drum well servicing units with 87' derrick, reverse equipment, tubing tongs, etc. truck mounted.

1-Mogul 42 Wilson double drum well servicing unit with 87' mast, tubing tongs, hand tools, etc. truck mounted. Box M-616, The Oil and Gas Journal, Tulsa, Oklahoma.

IDECO ROTARY UNITS

***SOME* PEOPLE ARE BUYING *NEW* EQUIPMENT**

Full Line Rotary Drilling Machinery, Tables, Swivels, Blocks, Drawworks, Masts, Pumps—All New Stock—IDECO.

Also Good Used Equipment, Pipe and Accessories.

LUCEY Products Corporation
Tulsa, Okla. LU 4-4711

PERFORATING & LOGGING EQUIPMENT

- **HOIST UNITS**
  NEW AND USED
- **LOGGING EQUIPMENT**
  ELECTRIC, GAMMA, NEUTRON, TEMPERATURE
- **PERFORATING**
  GUNS AND SUPPLIES
- **PLUGS**
  SETTING TOOLS, PLUGS, PACKERS AND DUMP BAILERS

FOR CATALOG AND PRICES WRITE TO:

GO PERFORATOR SUPPLY
Box 1936, Fort Worth, Texas
FOREIGN AND DOMESTIC SALES

FOR SALE EQUIPMENT

FOR SALE: Failing 1500 heavy duty Rotary. Full hydraulic automatic breakout table, hydraulic hold down. Mounted on 1961 International. 1300 feet of 2⅜" drill pipe, new core barrel, 2 drill collars. Price $18,200.00. Contact: Victor M. Loriaux, Star Route East, Nowata, Oklahoma.

USED GAS PROCESSING Equipment; Glycol and Dry Dessicant Dehydrators; Quick-cycle Hydracarbon Recovery Units; Water Flood Filter-pump Units. Also new oil and gas production equipment. Engineered Specialties Co., P. O. Box 35683, Phone FL 1-5284, Dallas 35, Texas.

25,000'
12¾" OD Used, ¼" Wall
Gas Line Pipe - Dresser End, SRL
@ $_____

10,000'
18"x5/16" ditto
@ $_____

Prompt Shipment From Stock
F.O.B. Columbus, Ohio
Columbus Steel Supply Company
1000 Bonham Avenue
Columbus 3, Ohio AX 4-4461

AT N. LITTLE ROCK, ARKANSAS

3—Worthington #LTC-4, compressors, 3500 CFM @ 45 PSI, 24 x 15, 2-cyl., 500 HP, 4-cycle, gas-engine drive.

Phone POplar 3-3505

PERRY EQUIPMENT CORP.
1402 N. Sixth St.
Philadelphia 22, Pa.

(6) 96,000 Bbl. 120'x48'

WELDED CONE ROOF
OIL STORAGE TANKS
INSTALLED NEW in 1952
Dismantled, Matchmarked For Reerection $75.00 N.T.
FOB Baltimore, Md.

HEAT & POWER CO., INC.
60 East 42nd St., New York 17, N.Y.
Boston & Haven Sts., Baltimore 24, Md.

Condensers, Reboilers, Exchangers, Fracionator columns various types, Surge Tanks, Butane Tanks, Propane Tanks, Centrifugal & Steam Pumps, Blowers, Complete Poly Plant, Flash Towers, Steam Turbines, Explosion Proof Motor Starters, Recorders & Controllers. Low Prices, Good Equipment. Located at Borger, Texas, Tulsa and St. Louis areas.

KINSLOW EQUIPMENT COMPANY
P. O. Box 5283
WE 9-6896, Tulsa 12, Oklahoma

HELP WANTED

TRANSLATORS-ENGINEERS WANTED—Proven ability to translate technical material into fluent English essential. Attractive full time or free-lance arrangement. All languages of interest, particularly Russian & Japanese. Send resume to: A•T•S, Inc., Drawer 271, East Orange, N. J.

CHEMICAL ENGINEER

For new Petrochemical Plant in Houston, Texas. Requires 2 to 5 years experience in operations or technical service. An excellent opportunity for a man seeking a responsible position in a small company with growth potential. Send resume to:

SINCLAIR-KOPPERS CHEMICAL COMPANY
P. O. Box 5536, Houston 12, Texas

MECHANICAL ENGINEER

Houston Manufacturing Company needs graduate M.E. with 3 to 5 years drilling, completion and production experience for Development Engineer position. Challenging work with commensurate salary for man with creative capabilities. Fringe benefits equal to major oil companies. Send resume to:

Box M-631
The Oil and Gas Journal
Tulsa, Oklahoma

PROJECT MANAGERS

PROJECT ADMINISTRATORS

for

Petroleum, Chemical, Petro-Chemical, Mining, Smelting and other projects in our several companies here and abroad, for which we need about a dozen absolutely top people.

Please send complete resume to Project Personnel

PARSONS

ENGINEERS-CONSTRUCTORS

Room 700, 617 W. 7th St.

Los Angeles 17, California

An Equal Opportunity Employer

HELP WANTED

WANTED—Manufacturer's Representative for Kansas and Texas Panhandle for established Line Complete Oil Well Subsurface Pumping and Production Equipment. Write. M-615, The Oil and Gas Journal, Tulsa, Oklahoma.

REFINERY CHEMICAL ENGINEERS SOUTH AMERICA

Desired for opportunities in modern refineries of an affiliate of STANDARD OIL COMPANY (NEW JERSEY) operating in South America. Candidates must be graduate Chemical Engineers with 5 to 10 years refinery experience and a thorough knowledge of process design and process control. Opportunities exist for assignments to Economics, Lubricants and Oil Movement, and Distillation Sections of Process Engineering Group as well as the Laboratory Group and Operating and Maintenance Groups. Salary including bonus from $15,000 to $17,000 annually depending upon experience. Liberal employee benefits including annual home vacations with travel allowance. Interviews will be arranged for qualified candidates. All replies confidential. Send complete resume of work experience and personal data to:

P. O. Box 518, Department E
Radio City Station
New York 19, New York

ENGINEER

Position in economic section of engineering department. Covers wide variety of preliminary design, cost estimating, and evaluation work dealing with present operations, regulatory commissions and diversification projects.

Applicant must have engineering degree; interest in economic aspects of engineering; and 1 to 5 years experience.

Salary commensurate with experience.

Headquarters in Colorado Springs.

Send resume of education and experience to

Employee Relations Department
COLORADO INTERSTATE GAS COMPANY
BOX 1087
COLORADO SPRINGS, COLORADO

COMBUSTION ENGINEER

Graduate chemical or mechanical engineer with 4 to 6 years experience, primarily in combustion work. Knowledge of unit processes involved in petroleum refining is desirable. Duties will include making studies and coordinating efforts to improve efficiency and control of furnace firing and effect savings in consumption of utilities at refinery process units.

PROCESS SYSTEMS CONTROL ENGINEER

Requires B.S. degree, preferably in chemical engineering, with 6 to 10 years experience in petroleum or chemical processing. Background must include application of instrumentation, including automatic stream analyzers. Will be responsible for making instrumentation studies, application recommendations and follow-up for proper operation of special instruments such as stream analyzers and automation equipment.

Positions at large Gulf Coast refinery. All replies held confidential. Send resume to Employee Relations Department.

MOBIL OIL COMPANY
P. O. Box 3311, Beaumont, Texas
An Equal Opportunity Employer

HELP WANTED

OIL JOB DIRECTORY, foreign and domestic, showing where to apply for jobs $5.00 cash OIML Co., Box 2903, Tulsa, Oklahoma.

POSITIONS OPEN

TRAINEES

Engineering degree desirable but not essential if experienced in any of the following fields: Oil Well Logging and Perforating, Cementing, Acidizing or Fracturing. Trainee positions leading to Sales or Line Management Positions in an expanding Company. Experience and others factors to determine exact salary figure. Send detailed resume to:

Industrial Relations

THE WESTERN CO.

P. O. Box 186
Fort Worth, Texas

SITUATIONS WANTED

PRODUCTION MAN thoroughly experienced in producing properties, well completions, and workovers wants position as production foreman or superintendent with growing independent. References upon request. Will relocate. Box M-621, The Oil and Gas Journal, Tulsa, Oklahoma.

PIPELINE ENGINEER—Project, Design, Estimating, Mechanical, Civil, General. Registered Professional Engineer and Land Surveyor. 30 years diversified experience. No degree but equivalent education plus excellent experience record. Write at once. P. O. Box 19163, Houston 24, Texas.

REGISTERED Petroleum Engineer—36, married. Fifteen years diversified experience from roughneck to production and drilling supervisor—Rio Grande to Mississippi, plus Foreign. Desire to return to the States. Box M-625, The Oil and Gas Journal, Tulsa, Oklahoma.

1961 PE GRADUATE, presently employed, desires position in reservoir work. Box M-627, The Oil and Gas Journal, Tulsa, Oklahoma.

SALES ENGINEER—presently employed in good standing, offers 10 years successful sales and service experience to a company seeking a reliable, efficient and dependable manufacturer's agent in Permian Basin-New Mexico area. Competent of "Know-How" and "Know-Who." Married, own home, 30. Top references and resume on request. Box M-628, The Oil and Gas Journal, Tulsa, Oklahoma.

REFINERY PROCESS ENGINEER

Experienced in administration and supervision of refinery process units, refinery programming and planning, economic evaluations, and process design. Twenty years diversified experience in South America with large integrated company. U. S. Citizen, age 47, Desires return U. S. Resume on request.

Box M-629, The Oil and Gas Journal
Tulsa, Oklahoma

PERSONALS

ATTENTION: Anyone knowing whereabouts of Elliott Daniels, oil engineer, known to have worked for Salmanca Oil, is a New Yorker please contact Major Piacenti, 7222 Dispensary, APO 291, New York.

ROYALTIES

ROYALTY BUYERS—Income producing gas-distillate royalty, new, deep, dual completed wells, Texas Gulf Coast. Tax benefits being 27½% of depletion allowance. Ogden Oil Company, P. O. Box 409, Taylor, Texas.

LEASE AND DRILLING BLOCKS

WRITE: Clayton Company, 211 Riverwood Drive, Bowling Green, Kentucky for cheap lease play on well-drilling to two-hundred fifty feet in Knox formation.

FOR IMMEDIATE 4,500 ft. drilling, Three Franklin County, Nebr., Blocks. Each well earns 2,000 acres. 5,000 acres Bent County, Colo., for 5,800 ft. test and 5% override. H. C. Petersen, 1017 Sidney Street, Omaha, Nebraska.

WORKING INTEREST, 1/192 for $194.44 in 4350' Throckmorton Co., Texas, prospect. 1400' from former commercial production. For S.E.C. Offering sheet and Geological report write: Box M-626, The Oil and Gas Journal, Tulsa, Oklahoma.

O&G LEASE SW/4 30-13-N-5W, Canadian County, Oklahoma. 10 year term. E. C. Suggs, 823 Hightower Building, Oklahoma City 2, Oklahoma.

APPROXIMATELY 150 acre lease. All productive area. 2 zones sure, 2 wells now producing. Can be improved. Gross now $1000 monthly. 1/6 royalty. All $40,000 or deal. 112 Honolulu Terrace, Whittier, California. OX 5-8623.

ARIZONA—Big "Helium" lease play. Leases Available near Majors $1.00 acre. Terms—Free Maps. Edward Colson, 1716 W. Devonshire, Phoenix, Arizona.

STARTING offset well to new Bartlesville Well just completed. Need three associates to drill and develop this joining lease. We own the new well we are offsetting. S & M Production Co., Box 59, Cherryvale, Kansas.

DO YOU HAVE A LEASE TO SELL? For as little as $5 per week you can tell your proposition to over 45,000 oil men through the Journal's classified advertising pages. You'll be surprised how many are interested.

FOR SALE: Up to ⅛ interest 40 acres offsetting new water flood. One well pumping, good investment for nice income, more good locations to drill. Montgomery County, Kansas. Bartlesville production 730 feet. Box M-593, The Oil and Gas Journal, Tulsa Oklahoma.

PRODUCTION WANTED

WANTED immediately:—Producing leases, royalties, or lands, anywhere. $5,000 to $5,000,000. Give price; description. Confidential. American Co., PO Box 38-J, Houston.

OIL MAPS

OIL LEASE MAPS
MORROW-MARION COUNTIES
OHIO **JENKINS ENGINEERING**
Phone 9186 **CARDINGTON, O.**

BUSINESS OPPORTUNITIES

FOR SALE: Must retire, will sacrifice supply business, house, etc., near new field. Box 299, Blanding, Utah.

SPECIAL OFFER to the first party replying to this advertisement I will assign a ⅛ working interest for only $300 to drill a shallow well on a well defined pool Northwest of the famous Oak Grove pool. Details write, Geologist P. O. Box 315, Coweta, Oklahoma.

FINANCIAL—Investment Banking Houses and Underwriters reached. Confidential You can send the details of your proposition direct or thru your attorney to Consultant 817—51st Street, Brooklyn, N. Y.

TESTING TOOL FRANCHISE

Fully patented, casing and tubing testing tools, proven by successful runs throughout the industry. Exclusive United States and Canada franchise available for an investment under $25,000. Write:

Marion D. Sell, 415 Security Building Denver 2, Colorado.

WILL PAY CASH FOR MANUFACTURING OR INDUSTRIAL PLANTS, CONSTRUCTION OR TRUCKING COMPANIES WITH ASSETS $250,000.00 OR LARGER. PRINCIPALS NOT AGENTS. WRITE BOX 8257, DALLAS, TEXAS.

BUSINESS SERVICE

BUSINESS SERVICE INVESTORS

Do you want your Drilling and Well Completion Tools developed and marketed? Either patented or applied for. Mail to Box 31 Q 284, The Oil and Gas Journal, Tulsa, Oklahoma. If interested, principal will negotiate, if not will advise promptly.

LIST OF 100 oil companies showing names of land-leasing managers and division land managers. $5.00. Oil Industry Mailing List, 405 Tuloma Bldg., Tulsa, Okla. (100 chief geologists. $5.00. Both lists. $9.00. Cash)

DELAWARE CORPORATION formed and serviced American Guaranty Trust Company. P. O. Box 487, Wilmington, Delaware.

PHOTOGEOLOGIC EXPLORATION

Start your exploration programs the modern way by utilizing our experienced oil finding techniques. Geologic and Geomorphic studies made of any where in the world by utilizing aerial photographic interpretations. Contact:

James N. Platt
Global Photogeologic Services
P. O. Box 134, Brookfield, Conn.

KARL A. RIGGS, Ph. D
Consultant
National *International*
Exploration & Production Investigations
Appraisals, Management & Reports
723 Penguin Drive Dallas, Texas

OIL AND GAS **JOURNAL**
Box 1260
TULSA, OKLAHOMA

Please check one so we can be of more help to you.

- ☐ We sell equipment.
- ☐ We want equipment.
- ☐ Need personnel.
- ☐ Want new job.
- ☐ Buy, sell leases or royalties.
- Other ☐ _____

Classified Advertising may help me. Will you send me complete information, including rates.

NAME _____ TITLE _____
COMPANY _____
ADDRESS _____
CITY _____ ZONE ___ STATE _____

DISCOVERY WELLS

Kansas

Harper County:
Tenneco Oil Co. 1 Forrest King, C SE SW 1-32s-5w. IPF 166 BOPD, ⅛-in. choke, open hole, Simpson 4,633-39 ft. TD 4,639 ft. New oil discovery.

Hodgeman County:
Sunray Mid-Continent Oil Co. 1 Miller estate, C SW NE 8-22s-22w, 4½ miles south of Wieland field, 7 miles northeast of Jetmore. IPP 198 BOPD, Mississippian 4,486-4,513 ft. TD 4,600 ft. PB 4,553 ft. New oil discovery.

Rice County:
Thunderbird Drilling Co., Inc., 1 Tobias, NE NW SW 25-20s-9w, 4½ miles southwest of Lyons. IPP 108 BOPD, no water, 43.9°, Arbuckle Cambro-Ordovician 3,362-72 ft. TD 3,440 ft. New oil discovery.

Trego County:
Chief Drilling Inc. 1 Huck, NW NW SW 25-11s-21w, 7 miles northeast of Ogallah. IPP 80 BOPD, Lansing open hole 3,861-64 ft. TD 3,864 ft. New oil discovery.

Oklahoma

Kay County:
Finston-Kenoil-Apache 1 State "A," C NE NE 36-29n-2w, 2 miles northwest of Braman. IPP 57 BO and 5 b.s. and w. per 12 hours, 40°, Miss. chat 3,741-54 ft. TD 3,785 ft. New oil discovery.

Kingfisher County:
Calvert Exploration Co. 1 River unit, SW NW NE 2-18n-9w. Southwest Lacey gas field. IPF 499 BO/7½ hours, 27/64-in. choke, FTP 475 psi., 38°, Meramec open hole 7,805-8,108 ft. TD 8,108 ft. New oil discovery inside gas field.

Stephens County:
Robert A. Hefner, Jr. 1 Hemming, SE NW SE 3-1n-9w. IPF 35,300 M.c.f.d., From Hemming sand 2,491-95; 54 BO, 46 BWPD from Jones 2,844-88 ft. SIP 792 psi. TD 3,058 ft. Oil and gas discovery, dual completion.

Southwest Texas

Atascosa County:
Richard Finney 1 Granburg, John Sharp Sur., A-761, 8 miles south of Lytle. IPP 10 BOPD, 31.6°, perf. 2,064-68 ft. TD 2,420 ft. Discovery well of Verna field.

Maverick County:
C. C. Winn 7 C. C. Winn-Fee, Section 249, Block 7, I&GN Sur., A-414, 7 miles east of Eagle Pass. Absolute open-flow potential 1,960 M.c.f.d., dry gas, shut-in TP 477 psi., perf. 1,237-50 ft. TD 1,250 ft. Discovery well of Eagle field.

Texas Gulf Coast

Lavaca County:
San Jacinto Oil & Gas Co. et al. 1 Bennie Buchanek, Luke J. Presnall Sur., A-355, 2 miles northeast of Hallettsville. Absolute open-flow potential 760 M.c.f.d., GLR 46,510 cu. ft. per bbl., 59.3°, shut-in TP 2,504 psi., perf. 7,191-7,201 ft., Wilcox TD 9,238 ft. New-field discovery.

Texas Offshore

Off Jefferson County:
Shell Oil Co. 2 Federal Block 160-OCS-0743, High Island Area Block 160. AOF 60 M.M.c.f.d., GLR 252 M.c.f. per bbl., 51.4°, shut-in TP 3,402 psi., perf. 8,650-55 ft. Miocene. TD 11,722 ft.

ADVERTISERS IN THIS ISSUE

A

Air Reduction Sales Company 217
Allied Chemical—
Nitrogen Division 40
Aluminum Co. of America 209, 211, 213, 215
American Cyanamid Company, Refinery Chemicals Department 74
American Iron & Machine Works Company Subsidiary, American Machine & Foundry Co. 56
American Machine & Foundry Co.—
American Iron & Machine Works Co. 56
Maxim Evaporator Division 237
American Meter Company 205
American Steel & Wire Division 258, 259
Anderson Company, The V. D. 216
Appleton Electric Company 76
Aquaness Department, Atlas Chemical Industries, Inc. 232, 233
Associated Electrical Industries Export, Ltd. 33
Axelson-Garrett Division of U. S. Industries, Inc. 261

B

BJ Service, Inc., A Borg-Warner Subsidiary 102
Baash-Ross Division of Joy Manufacturing Company 86
Baker Oil Tools, Inc. 106, 107
Baroid Division, National Lead Co. 192, 193
Bender Co., The, Division of Bender Oil Operation 189
Bendix Corporation, The, Scintilla Division 210
Bethlehem Steel Company 242
Black, Sivalls & Bryson, Inc. 108
Bonney Forge & Tool Works 241
Bowen Itco, Inc. 44
Braniff International Airways 18
Brown & Root, Inc. 172
Brown & Sharpe Precision Center 245

C

C-B Southern, A Division of the Cooper-Bessemer Corporation 45
California Research Corporation, A Standard Oil Co. of California Subsidiary 97
Cameron Iron Works, Inc. 61
Caterpillar Tractor Co. 184
Chemical Construction Corporation 206, 207
Chevrolet Division of General Motors 238, 239
Chicago Pneumatic Oil Tool Division 266, 267
Classified Advertising 292, 293, 294
Colorado Fuel and Iron Corp. 81
Connelly, Inc. 201
Consolidated Controls Corporation, Power Grip Couplings Division 214
Continental-Emsco Company, a Division of the Youngstown Sheet and Tube Company ..... 174 through 179
Crose-Perrault Equipment Corp. 201
Curtiss-Wright Corporation, Marquette Division 212

D

Daniel Orifice Fitting Company 236
Darling Valve and Mfg. Co. 13
Davison Chemical Company Division of W. R. Grace & Co. 1
Dayco Corporation, Rubber Products Division 218, 219
Dearborn Chemical Company 93
De Laval Steam Turbine Company 208
Denver U. S. National 236
Diamond Chain Company, Inc. 60
Dorr-Oliver Incorporated 234, 235
Dover Corporation, W. C. Norris Division 200, 216
Dowell ..... 198, 243, Inside Back Cover
Du Pont 8, 9, 17, 35

E

Eaton Manufacturing Company, Axle Division 66
Esterbrook Pen Company 49
Ethyl Corporation 161

F

Federal-Mogul Service Division of Federal-Mogul-Bower Bearing, Inc. 48
Fenix & Scisson, Inc. 205
First National Bank & Trust Co. of Tulsa 262
Fuller Transmission Division Eaton Manufacturing Company 37

G

Gates Rubber Co., The 89
Goodrich Industrial Products Co., B. F. 3
Goulds Pumps, Inc. 276
Griscom-Russell Co., The 71
Grove Valve and Regulator Company 94, 95

H

Halliburton Company 6, 7, 248
Hartzell Propeller Fan Co., Division of Castle Hills Corp. 96
Houdry Process Corporation 168
Hughes Tool Co. ..... Back Cover
Humble Oil & Refining Co. 2

I

Ingersoll-Rand 58, 59

J

Jet Lube, Inc. 271
Johns-Manville Corporation 260
Jones & Laughlin Supply Division ..... 19 through 31
Jones Company, The S. M. 220

K

Kelley Company, Ben F. 256
Kellogg Co., The M. W. 32

L

Liberty Mutual Insurance Company 4
Litwin Engineering Company 257
Lone Star Steel Company 182, 183
Lufkin Foundry & Machine Co. 82

M

Mack Trucks, Inc. 270
Marsh Instrument Co. 221
Martin-Decker Corp. 236
Martin, Manufacturer, John N. 273
Mayo Hotel, The 271
Maxim Evaporator Division, American Machine & Foundry Company 237
McKissick Products Corporation 224
Mid-America Pipeline Company 101
Mid-Continent Supply Company 269, 271, 273, 275, 277, 279
Midwest Piping, A Division of Crane Co. 240
Minneapolis-Honeywell Regulator Co. 62, 63
Mission Mfg. Company 280
Mixing Equipment Co., Inc. 272
Motorola Communication & Electronics, Inc. 41

N

Nalco Chemical Company 87
Nash Engineering Co. 34
National Bank of Tulsa 75
National Lead Company 72
National Supply Company, Subsidiary of Armco Steel Corporation 67, 68, 69, 70
National Tank Company 296
National Tube Division 46, 47
Norris, W. C., Division, Dover Corporation 200, 216

O

Ohio Injector Company, The 73
Oil Well Supply Division 228, 229
Otis Engineering Corporation 64

P

Pacific Pumps, Inc., A Division of Dresser Industries, Inc. 52
Parkersburg Division of Parkersburg-Aetna Corp. 36
Petroleum Distributing Company 277
Petroleos Mexicanos 84
Pipe Inspectors Division of Plastic Applicators, Inc. 244
Pittsburgh-Des Moines Steel Company 12
Pittsburgh Steel Company 246, 247
Procon Incorporated 88

R

Rector Well Equipment Co., Inc. 53
Reda Pump Company 275
Republic National Bank of Dallas 274
Republic Steel Corporation 202, 203, 204
Rock Island Oil & Refining Co., Inc. 57
Rockwell Manufacturing Company ..... Inside Front Cover
Rolo Manufacturing Company 78, 79
Ross-Martin Company 205
Royal Bank of Canada, The 16

S

Schlumberger Well Surveying Corp. 167
Security Engineering Division, One of the Dresser Industries 90, 91
Sinclair Oil Corporation 165
Smith Corporation, A. O. 38, 39
Solar, A Subsidiary of International Harvester Company 231
Southwestern Pipe, Inc. 85
Sperry-Sun Well Surveying Company 278
Square D Company 83
Stewart & Stevenson Services, Inc. 42, 43
Studebaker-Packard Corporation 253

T

Texas Bank and Trust Company of Dallas 269
Texas Capital Corporation 264
Texas Instruments Incorporated 98
Thomas Flexible Coupling Co. 263
Thornhill-Craver Co. 5
Timken Roller Bearing Company, Steel and Tube Division 77
Trinity Portland Cement Division, General Portland Cement Company 196
Tube-Kote, Inc. 225
Tube Turns, Division of Chemetron Corporation 50, 51

U

Union Carbide Chemicals Company, Division of Union Carbide Corporation 100
United States Rubber Company 14, 15
United States Steel Corporation—
American Steel & Wire Division 258, 259
National Tube Division 46, 47
Oil Well Supply Division 228, 229
Universal Oil Products Company 54, 55, 65

V

Valley Electric Corp. 279
Varec, Inc. 222, 223

W

Warner Lewis Company, Division of Fram Corporation 99
Warren Petroleum Corporation 104
Warren Pumps, Inc. 227
Well Equipment Mfg. Corp. 226
Wheland Company, The 268
Wilson Manufacturing Company 227
Wilson Supply Company 80
Wisconsin Motor Corporation 265
Worthington Corporation 10, 11

NATIONAL®
METER PROVER

MANUFACTURED TO API CODE 1101 SPECIFICATIONS

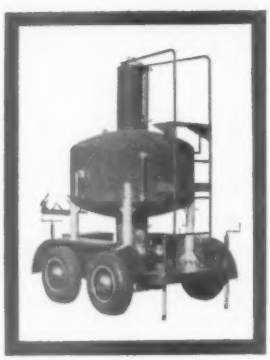
PORTABLE or STATIONARY
ATMOSPHERIC or PRESSURE

SPARK-PROOF HINGED ALUMINUM LID ON UPPER NECK OPENING
MANWAY WHERE REQUIRED FOR PROPER APPLICATION OF INTERNAL COATING
24" WIDE PIPE LADDER WITH NON-SKID PLATFORM
PRESSURE HEAD FOR MAXIMUM ACCURACY
THREE FACTORY CERTIFIED THERMOMETERS
BRASS SCALE PLATES ON UPPER AND LOWER NECKS, ETCHED AFTER CALIBRATION AND DOWEL PINNED IN PLACE FOR TAMPER PROOF ACCURACY
CONE BOTTOM FOR COMPLETE DRAIN DOWN WITH VORTEX ELIMINATOR BAFFLE
¾" O.D. GAGE GLASS WITH FULL OPENING GAGE COCKS
IN & OUT
ZERO WIER WITH GATE VALVE
OPTIONAL IN AND OUT
DRAIN
STANDARD SPECIFICATIONS NATIONAL TYPE 1 ATMOSPHERIC PROVERS

For maximum accuracy and dependability, specify National Meter Provers. Standard sizes from 5 to 25 Bbl., and pressures to 1200 psi. Other sizes and pressures available.

Standard design includes full compliment of accessories necessary for field operation. Baked-on internal coating shop-applied under controlled conditions. Portable models mounted on heavy-duty, four-wheel trailer with coil springs, fenders and lights.

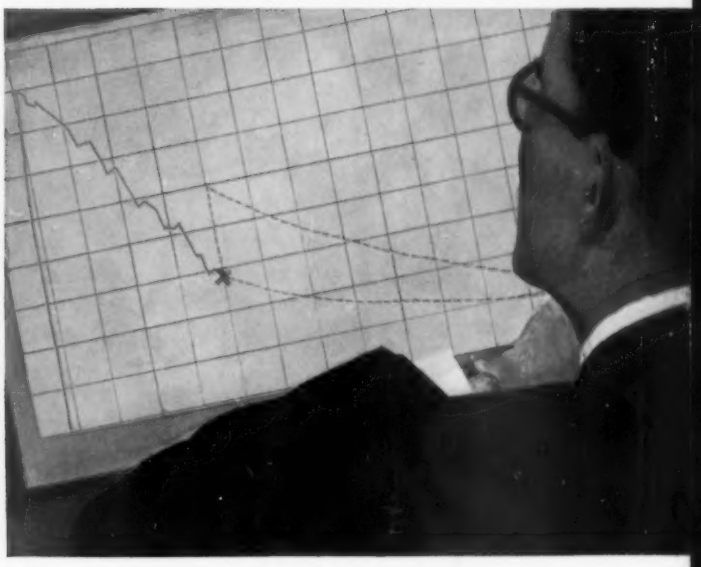
Certified Shop Calibration, Shop-Applied Insulation, Skid Mounting and Piping, Custom Fabrication available from NATIONAL.



It's National®

NATIONAL TANK COMPANY

DRAWER 1710
TULSA, OKLAHOMA



how Dowell planning helps make your frac jobs more profitable

Planning often makes the difference between the financial success and failure of a frac job. Here are four of the important planning steps Dowell engineers often recommend. When these steps are performed, there is no extra charge.

TESTING of formation samples and produced fluids with treating chemicals at Dowell laboratories helps avoid emulsion or plugging problems that might limit production increases. These tests are not always needed, but they are recommended whenever well conditions are encountered that vary from past studies, for example, in wildcat wells and edge wells.

SELECTING the most promising frac fluid and propping agent is aided by Dowell's fracture conductivity testers. Different treatment combinations can be compared and the most desirable one selected.

CALCULATING probable results for various sizes and types of treatments can be done by an electronic computer programmed with Dowell's engineering method—the Frac Guide*. Production increases and payout times are predicted, enabling the operator to select the optimum treatment for his purposes.

TIMING of a frac job is vital if an operator wants the maximum ultimate recovery with minimum total cost of production. Realizing the importance of timing, Dowell has placed new emphasis on the study of decline curves and formation energy records to help you decide **when** to fracture each well.

Ask about how these Dowell planning steps can be used to help you increase profits from your frac jobs. Dowell services and products are offered in North and South America, Europe, North Africa and Iran. Dowell, Tulsa 14, Oklahoma. *DOWELL SERVICE MARK

SERVICES FOR THE OIL & GAS INDUSTRY

DOWELL

DIVISION OF THE DOW CHEMICAL COMPANY

More goes into Hughes rock bits

...more RESEARCH!

...more EXPERIENCE!

...more ENGINEERING KNOW-HOW!

You get more performance out of Hughes rock bits, because *Hughes* puts more into them.

Hughes drilling research spans more than 50 years. It has been responsible for every major advance in cone-type bits . . . and contributed importantly to the advancement of drilling techniques.

The engineering know-how and experience that go into today's rock bits have been gained by Hughes in designing and processing bits used in drilling more than 2½ billion feet of hole throughout the world.

For the contractor or operator who runs Hughes bits this adds up to consistent, dependable performance, and more economical footage.

HUGHES TOOL COMPANY® *ORIGINATOR*

AND WORLD'S LEADING DEVELOPER OF CONE-TYPE ROCK BITS